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16. ABSTRACT

This study is one of 70 volumes assessing the workforce needs (manpower needs) for pollution control and abatement in the United States for the five-year period of 1976 through 1981. Seven fields for pollution control — air, noise, pesticides, potable water, radiation, solid waste, and wastewater — are analyzed, together with energy-related programs currently accentuated by the national effort to solve energy supply problems.

Designed as Phase I of a three-phase program, the complete assessment includes the following volumes: one each for the 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands; one for each of the ten EPA regions; a one-volume National Abstract; a volume on National Legislation; a volume on Business and Industry; and a four-volume National Summary. The information was gathered through extensive personal interviews with responsible federal, state, and local officials in every state; with officials of representative private industrial and commercial firms; and with representatives of national industrial and trade organizations.

Phase II will develop a broad national inventory of the entire range of post-secondary and higher education training offered in the pollution control and energy areas cited above, and Phase III will offer demonstrations for curriculum changes or modifications which appear necessary to assure an adequate and properly trained national environmental/energy workforce.

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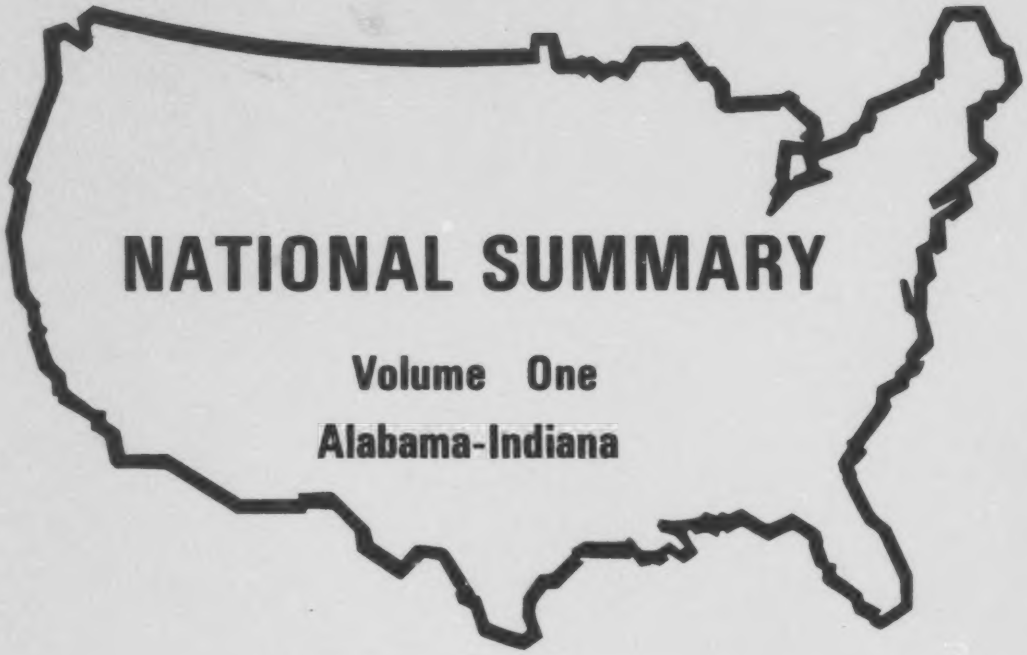

NATIONAL SUMMARY

Volume One

Alabama-Indiana

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NATIONAL ENVIRONMENTAL/ENERGY
WORKFORCE ASSESSMENT

NATIONAL SUMMARY

Alabama-Indiana

VOLUME ONE

Conducted by:

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National
Field
Research
Center, Inc.

Box 287
Iowa City, Iowa 52240
(319) 351-8789

INTRODUCTORY NOTE

The National Environmental/Energy Workforce Assessment was conducted by National Field Research Center, Inc. with main offices in Iowa City, Iowa. The following personnel have had primary responsibility for the Assessment and project report.

IOWA CITY, IOWA
  Dr. Darold E. Albright, President
  Paul E. Bridges, Executive Director
  Dr. Richard L. Benesh, Project Director
  Judith J. Gordon
  Alan M. Stowell
  Anita M. Stowell
  Mary Kay (Edge) Wade

ATLANTA, GEORGIA
  Elizabeth G. Nielsen, Regional Director
  Robert Oxberger

DENVER, COLORADO
  Nancy C. Dillenberg, Regional Director

SEATTLE, WASHINGTON
  Steven Silva, Regional Director

WASHINGTON, D.C.
  Frank E. Smith, Project Coordinator
  Lloyd B. Chaisson, Assistant Project Coordinator
  Jack F. Seum

Additional research and clerical assistance was provided by Frederick M. Wall, Maxine Wolfe, Margaret Fehn, Sandra Hogsed, Karen Kirchoff, Sharon Leiker, Marilyn Low, Mary McCormac, and Joan Urquhart.

FIELD OFFICES

ATLANTA
2700 Cumberland Pkwy
Suite 150
Atlanta, GA 30339
(404) 433-2644

DENVER
2600 S. Parker Rd.
Suite 180, No. 6
Denver, CO 80232
(303) 751-4962

SEATTLE
927 United Pacific Bldg.
1000 2nd Ave.
Seattle, WA 98101
(206) 623-9170

WASHINGTON D.C.
1522 K Street, N.W.
Suite 600
Washington, D.C. 20005
(202) 223-9138

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The names of the federal, state and local agencies, groups and individuals who made this study possible through their patience and cooperation would be too numerous to mention. However, it must be pointed out that the information in these summaries and the other volumes of this study is a direct consequence of their participation. The research staff served largely as reporters and documenters of the facts and opinions they provided. In some instances, the authors supplied editorial commentary, but it was with the knowledge and understanding of the particular data source. Essentially, the study is theirs, from the landfill operator or the pesticide applicator to the state, regional or the federal administrator. Its relative degree of success will be a direct corollary of the credibility decision makers attach to the information furnished by those professionals working in the fields considered by this study.

National Field Research Center
Iowa City, Iowa
Dr. Richard L. Benesh, Jr.
Project Director

PREFACE

In reviewing these summaries, it should be pointed out that differences in the consistency of information is a reflection of several factors. To begin, for a number of states, figures were either not available at the time the field research was carried out or respondents were reluctant to provide estimates because of the tenuous nature of state and local program output reporting. In a majority of instances, these circumstances were a consequence of budgetary constraints imposed by state legislatures. Thus, state and local environmental control officials have been confronted with a situation where they must depend, in large measure, on federal funding programs to maintain minimal operational status, which is not always in compliance with federal mandates. Still, some states have been especially active in mounting environmental programs consonant with federal standards and uniquely suited to their particular problems. In these cases information is relatively complete and documented to be accurate.

Moreover, the presence or absence of workforce information may be said to be a measure of the individual state approach to the importance of environmental pollution control and abatement programs; the degree of support provided by state and local government; the support for program operation and maintenance provided by the federal government; and, the immediacy of environmental pollution problems in a given state or area.

Finally, though less quantifiable, but frequently voiced, program officials in several states were less than enthusiastic about participating in the assessment because they felt that little if any positive, substantive action would come of the effort. With this in mind, it is understandable that there would be occasional reluctance to "go the extra mile" in providing professional judgments regarding specific workforce figures or projections. Still, in the great majority of instances, program officials did go the extra mile as evidenced by their frequently unsolicited post-research interest in reviewing assessment outcomes.

All of the foregoing are indicators of what might be termed an inconsistency in the level of reporting. However, it is more nearly correct to assert, given the experience of the project, that these informational disparities as well as the converse informational completeness of many states are a reasonable and accurate representation of the state of the art across the nation. This can be exemplified by singling out states, for instance, which on one hand have no mandatory certification for water treatment plant operators or no legislation governing the amounts of pollutants emitted into the air, and comparing them with those which have comprehensive legislation and commensurate funding to support that legislation. These summaries, then, while they may present reasonable estimates of the national environmental/energy workforce situation, may do more to represent the problems of individual states with respect to meeting national standards, e.g., some cannot, some will not and some may not have a need or a desire for federal assistance.

In sum, these state briefs may be distilled down to a postulate which suggests too little consistent articulation of federal policy and too little continued support for maintenance of programs which are either stop-gap in their efforts to contain pollution or have questionable long-range cost or human benefit.

FOREWORD

This report contains the state summaries of the National Environmental/Energy Workforce Assessment conducted for the United States Environmental Protection Agency by the National Field Research Center of Iowa City, Iowa. Each individual state program summary is followed by a depiction of the current and projected (1976-1981) workforce figures for the following areas:

AIR
NOISE
PESTICIDES
POTABLE WATER
RADIATION
SOLID WASTE
WASTE WATER
ENERGY

An overview of selected environmental/energy education programs has also been included. These programs do not necessarily represent the entire spectrum of available opportunities, but rather a sample of those significant, well-defined offerings which address the workforce needs of the disciplines outlined above.

More detailed information regarding the workforce assessment is to be found in the respective State or Regional volume of the study.

National Environmental Energy Workforce Assessment

Phase I

ALABAMA

State Summary

I. AIR

The Alabama Air Pollution Control Commission is responsible for implementing the Air Pollution Control Act of 1971. The Commission's technical staff is the Division of Air Pollution Control in the Department of Public Health. There are also four local air pollution control programs in the state.

The State air pollution agency employs 45 permanent full-time employees, supplemented by the efforts of two federal assignees, one co-op student and 13 part-time employees. Professional positions include engineers, statisticians, and pollution control specialists. This Division does not anticipate that a staffing increase will occur unless amendments to the Federal Clean Air Act are enacted, in which case an estimated 20 additional persons might be required. Local programs currently contain a combined total of 43.1 person-years for air pollution control. This figure is expected to increase to approximately 57 over the next five years.

The Tennessee Valley Authority's air pollution control staff, a part of the agency's Division of Environmental Planning, is located in Muscle Shoals, Alabama. This program employs 168 people, and is expected to increase to approximately 193 over the next five years.

Sources estimate that each of the state's 816 major industrial polluters employs at least one person for air pollution control, and that there are approximately 100 consultants servicing the field. It thus appears that in excess of 1,000 persons in the public and private sector work in the field. Most of the workforce growth is expected to be in the private sector.

II. NOISE

The State of Alabama currently does not have a noise pollution control and abatement program and there is no clear indication at the present time whether or not enabling legislation for a program will be passed within the next five year period. One person in the Department of Public Health spends less than 10% of his time as the state's official noise contact, answering public inquiries and assisting universities, county health departments and other groups with noise problems, maintaining files and making minor noise measurements. The only legal authorities relate to motor vehicles and public nuisances.

According to available information, six Alabama communities have some type of noise control ordinance in effect. The most common type of ordinance is the nuisance variety which usually includes no acoustical criteria.

Surface mining operations in the northern part of the state instigate citizen complaints due to blasting activities. Sources believe this situation could provide impetus for the passage of noise control legislation. Federal support could also provide such an impetus.

Most industries in the state do not employ noise engineers or specialists, but utilize safety engineers that as a part-time function may deal with environmental noise. Sources in the field indicate that the growth prospect for careers in environmental noise control is not good unless federal initiatives compel the legislature to pass enabling legislation.

III. PESTICIDES

The Division of Agricultural Chemistry, a part of the Alabama Department of Agriculture and Industries, holds chief responsibilities for the state's pesticide program, and carries out applicator certification, pesticide registration and enforcement of applicable laws. Eight inspectors are employed, as well as twelve persons (chiefly chemists and laboratory aides) in the Division's analytical laboratory. Officials assert that a strong need exists for additional inspectors, and an additional 20 are projected to be required by 1982.

The Environmental Health Administration employs an entomologist who works on public health vectors, such as mosquito and rat control. Officials estimate that there are approximately 400 communities in Alabama that have vector control programs, and each program has at least one person who uses pesticides.

There are 146 custom applicators and 275 supervisors currently operating in Alabama. Approximately 16,000 permitted private applicators are allowed to use restricted-use pesticides. There are also 434 licensed pesticide dealers. The number of custom applicators, including supervisors, is expected to annually increase by 2 to 3% by 1982, while the number of dealers is expected to remain constant.

Training to custom applicators and dealers is provided by the Cooperative Extension Service at Auburn University. The Extension Service utilizes 7 extension specialists for this purpose.

IV. POTABLE WATER

Alabama's potable water program is carried out by the Division of Public Water Supplies in the Alabama Department of Public Health. The Division has expressed an intent to assume primacy for the Federal Safe Drinking Water Act, but state legislation will require revisions.

Including the Water Well Standards Board, the Division has a staff of 15 full-time personnel, including 7 civil engineers and 3 environmentalists. The Department's Division of Laboratories analyzes water supplies and employs 15 personnel, including 7 scientists, 2 technicians, 2 laboratory aides and 3 secretaries. In order to carry out all required responsibilities of the Safe Drinking Water Act, the Division of Public Water Supplies would need to hire an estimated 16 additional personnel, engineers and environmentalists.

Alabama has implemented a mandatory certification program since 1971 for operators of water treatment plants and distribution systems. There are currently 1,098 certificates issued to operators of plants and systems. Alabama has a Water Treatment Training Program conducted by the State Department of Education. Specialized courses in the field are also offered by the Department across the state in the field of water treatment. The Alabama Section of the American Water Works Association also offers seminars for operators. In addition, the Alabama Water and Pollution Control Association conducts an annual short course for operators. Examinations for certification are prepared by the Division of Public Water Supply.

V. RADIATION

The Division of Radiological Health of the Alabama Department of Public Health carries out the state's radiological health program. The program carries out radioactive materials licensing and inspections, radiation-emitting machine registration and inspection, environmental monitoring, and emergency response procedures. A radiation bill will be submitted to the Alabama General Assembly. If passed, this bill will allow the Division to acquire additional monies to hire needed personnel for the medical and dental X-ray program. The Division currently has a staff of 7: 3 radiation physicists, 1 technician, a director and a secretary. If the new legislation is passed, this number could double, and additional radiation physicists and technicians would be hired.

The Bureau of Environmental Health in the Jefferson County Department of Health operates the state's only local radiation program. This program employs 2 persons: a public health physicist and a radiological health inspector. This staff may double within one year, adding an additional public health physicist and an additional inspector.

State officials have expressed needs for the development of short courses, including the following: inspecting and regulating radiation-producing materials and equipment, inspecting and regulating radiation problems in phosphate mines, and the fundamentals of environmental health.

VI. SOLID WASTE

The Division of Solid Waste Management and Vector Control of the Alabama Department of Public Health is responsible for carrying out the state's solid waste program. The program is based on a cooperative arrangement with approximately 200 local county environmental officials. A new hazardous waste management bill has been drafted to be compatible with the Federal Resource Conservation and Recovery Act of 1976. The Division is currently staffed with four persons. The new legislation could double or triple this number by 1982, and those persons recruited would include chemical engineers, environmentalists and clerical personnel. A chief activity will be the development of a comprehensive system to regulate hazardous waste disposal activities in the state.

The total regulatory workforce for solid waste is estimated to be 250, including state and county employees. The local programs are not anticipated to have a considerable increase in staff over the next five years.

State sources are optimistic that the hazardous waste bill will become law during 1977. The response of private industry to the bill has been very favorable, and officials project that the new program may cause industry to have increasing workforce needs in the field of hazardous waste management and disposal.

VII. WASTEWATER

The Alabama Water Improvement Commission exercises principal program responsibility for Alabama's wastewater pollution control and abatement activities. The staff of the Commission is comprised of 63 persons and 19 vacant positions, for which there are currently no funds to support. Of the 63 positions, 41 are filled with professionals and 22 are filled with clerical and temporary personnel. Because of state budget restrictions, growth is not expected to be dramatic. The bulk of positions gained during the next five years will likely stem from the filling of the currently-vacant positions. Recruitment emphasis will likely be placed upon hiring engineers and biologists. Currently employed are engineers, scientists and technicians.

The state requires that operators of waste water treatment plants be certified. There are currently 654 certificates issued to operators. The total number of operators is expected to increase approximately 10% annually, although the number of Grade I operators is expected to decline, as many primary plants will be phased out.

Operator training is conducted during an annual Short Course School sponsored by the Alabama Water and Pollution Control Association. Instruction is also given across the state by the State Department of Education's Post-Secondary and Continuing Education Division. During Fiscal Year 1976, 705 students took part in this program.

VIII. ENERGY

The Energy Management Board and the Energy Advisory Council are the two state bodies concerned with energy-related matters in Alabama. The Council was established to assess demand trends and supply potential for all forms of energy and to reconcile environmental matters associated with energy source developments and production. Activities of the Board include fuel allocation, natural gas supply and energy conservation. The Council has twelve members, while the Energy Management Board has seven members. The Board also has a staff director, three clerks and a secretary. By 1982, the director hopes to obtain an additional seven positions, including engineers, a statistician and an economist.

Alabama Power Company's Division of Environmental and Technical Services employs 32 persons, including engineers, chemists, biologists, and other personnel. The future growth or decline of this staffing level will in large part be contingent upon federal and state legislation and directives.

The Tennessee Valley Authority's radiological hygiene and air quality programs are located in Muscle Shoals, Alabama. These programs employ a total of 234 persons. This number is projected to increase, particularly for radiological hygiene.

The most active growth in the energy field will probably be in the coal and nuclear areas. Engineers and scientists with backgrounds in these fields should have the best career potentials.

STATE OF ALABAMA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	256	268	283	297	305	315	4%
NOISE[2]	1	1	1	1	1	1	0%
PESTICIDES[3]	1,283	1,299	1,316	1,334	1,352	1,371	1%
POTABLE WATER[4]	30	32	35	39	43	46	9%
RADIATION[5]	9	13	18	18	18	18	16%
SOLID WASTE[6]	250	253	256	259	262	265	1%
WASTEWATER[7]	717	741	764	786	817	826	3%
ENERGY[8]	5	7	9	10	11	12	20%
TOTALS	2,551	2,614	2,682	2,744	2,809	2,854	2%

[1] Includes the state agency and assumes passage of amendments to the Clean Air Act, local programs and TVA's air staff in Muscle Shoals. There are approximately 900 persons in the private sector in the field; this number is expected to grow.

[2] Represents 1 person in the Department of Public Health. If noise legislation is passed, workforces would increase in the public and private sectors.

[3] Includes the state agency (1976=20;1981=40), the Extension Service, municipal vector control programs, custom applicators, supervisors and dealers. Does not include approximately 16,000 private applicators.

[4] Includes the state agency, based upon assumption that primacy will be achieved. There are 1,098 certificates issued to operators of treatment plants and distribution systems.

[5] Includes the state and local programs, and assumes passage of the state radiological health bill.

[6] Includes the state and local agencies.

[7] Includes the state agency (1976=63;1981=90) and certified wastewater plant operators.

[8] Includes staff members of the Alabama Energy Management Board.

EDUCATION

Environmental/energy curricula are available in several forms in Alabama. Auburn University's School of Engineering offers in its Chemical Engineering and Civil Engineering Departments courses in environmental fields. In the Biology Department of Auburn University at Montgomery, two environmental options are offered: Environmental Studies and Environmental Technology.

An Environmental Science Certificate Program is offered at the University of Alabama at Huntsville, which is a supplement to an academic degree. Bachelor-level degrees in Mineral Engineering and Civil Engineering (with environmental coursework) are offered at the University of Alabama. Master's degrees in Mineral Engineering and Environmental Engineering are also offered.

The Civil Engineering Department at the University of Southern Alabama offers courses in air, water supply, wastewater and solid waste. A master's degree in Environmental Sciences is offered by the Tuskeegee Institute. In addition, Alabama A & M University offers a B.S. degree in Environmental Science designed to prepare students for graduate study or technician-level environmental employment.

A two-year environmentally-related curriculum is available at the Southern Union State Junior College. Offered is an Associate in Applied Science Degree in Aquatic Technology.

LEGISLATION

The environmental/energy legislation for Alabama was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Air Pollution Control Act of 1971
Custom Application of Pesticides Act
Pesticide Act of 1971
Public Water Supply Systems and Waste Water Treatment Plants Law
Radiation Control Act
Hazardous Wastes Management Act of 1976
Solid Wastes Disposal Act
Solid Waste Financing Act
Water Improvement Commission Act
Surface Mining Reclamation Act of 1975

National Environmental Energy Workforce Assessment

Phase I

ALASKA

State Summary

I. AIR

Within the State of Alaska, the Department of Environmental Conservation, Air Quality Section, maintains regulatory responsibilities concerning the control and abatement of air pollution.

In addition to the regulatory efforts of the Department, the municipal boroughs of Fairbanks and Anchorage provide support through local air pollution control agencies.

Public sector workforce activity involves 15 professional personnel. This workforce consists of engineers, technicians, inspectors, and administrators. Due to the limited amount of industrial activity, private sector workforce levels are expectedly low, although specific figures were not available.

Future workforce projections indicate that over the next five years five additional staff positions will develop in response to increased regulatory responsibility.

Currently, only limited training activity in air pollution is available. As technological advances in pollution control equipment continue, a need for upgrade training is expected to develop.

Considering that potential resource development activity is expected to expand dramatically in years to come, and in view of the delicate environment in which this activity is anticipated to occur, increased planning, monitoring and regulation enforcement of air quality standards will be necessary to ensure the maintenance of a quality environment for Alaska's inhabitants.

II. NOISE

In Alaska, as noise is not considered a statewide problem at this time, regulatory activity is contained within municipal ordinance enforcement.

Currently there are three Alaskan cities which have noise regulations. Juneau and Ketchikan have regulations pertaining to the area of nuisances only, while Anchorage has regulations pertaining to the areas of nuisances, vehicles, and recreational vehicles.

As the noise control area is a low priority, the workforce figures reflect this. Even though Juneau, Ketchikan and Anchorage all have municipal noise ordinances, Anchorage is the only municipality that has a full-time staff position, this occupied by an environmental field officer. The other cities allocate staff efforts on an occasional basis only.

According to field sources, workforce activity on the state and local level is not expected to change dramatically over the next five years. The possible addition of two staff positions in Anchorage does exist, however, this possibility is contingent upon adoption of a recently proposed noise ordinance.

There are no formal training or certification programs presently available in noise, but future education of the public is planned for Anchorage residents with the adoption of the proposed ordinance.

III. PESTICIDES

The Department of Environmental Conservation, Terrestrial Programs Section, is the principal regulatory agency responsible for the control and abatement of pesticide pollution.

Statewide workforce figures involve two professionals within the Department and an estimated 212 individuals within the private sector. The Department staff holds degrees in the biological sciences area. Private sector personnel figures are based on present certification levels.

Workforce projection information indicates no growth at the state regulatory level and extremely limited growth within the private sector.

The State Cooperative Extension Service, in conjunction with the University of Alaska, provides certification training activities. In 1975, over 150 pesticide applicators and other personnel involved in pesticides and broadcast chemical work were trained in pesticide selection, handling, and application.

Job opportunities, while limited, will continue in the area of pesticide application. Federal decisions concerning classification of restricted-use pesticides may also impact future job opportunities. As pesticide technology becomes increasingly specialized, highly trained professionals will be needed to research and investigate the effects of new and multiple-use pesticides. Even then, agriculture development continues to be hampered by limited local market conditions, high clearing and development costs, insufficient crop lands, and climatic conditions.

IV. POTABLE WATER

In Alaska, the authority to develop, implement, and enforce safe drinking water standards is vested in the Department of Environmental Conservation, Water Programs Section.

Public sector workforce activity involves the efforts of eight professional personnel. This workforce consists primarily of sanitary engineers who provide planning, management, and enforcement efforts.

Presently, private sector workforce activity is limited to water treatment plant operators. Because certification of water treatment personnel has not yet been accomplished, specific private sector workforce figures are not available.

Public sector workforce projections indicate a growth in staffing positions by an additional ten over the next five years. Six of the ten positions will be involved with implementation of the Village Safe Drinking Water Act.

Although private sector workforce is expected to experience growth, projections based on the limited information available would be speculative.

A mandatory certification program for water treatment plant operators was established through legislation in 1976. The provision of training pursuant to certification is expected to necessitate a dramatic increase in training efforts at both the state and local levels.

V. RADIATION

Regulatory authority for the control and abatement of radiation pollution is presently vested within the Department of Health and Social Services, Environmental Health Section.

Currently no full-time staff have been assigned to the radiation control program. However, sources in the field have suggested that within the next five years, at least one full-time professional position will develop. This position is expected to be filled by a radiation physicist.

Considering the simplicity of the current program and the limited growth anticipated in the future, no current or future training activities are expected to be provided regarding radiation pollution control.

Although no specific private sector workforce figures are available, activity is expected to be extremely limited due to the minimal use of radiation by Alaska's industrial concerns.

Career potential is expectedly going to be extremely limited at the public sector level. However, the possible generation of private sector career opportunities may develop for persons trained as radiation control technicians in response to future uranium mining activities.

VI. SOLID WASTE

The Department of Environmental Conservation, Terrestrial Programs Section, in conjunction with the Field Operations Section, develops and maintains the State solid waste management program. A total of eight full-time professional staff are involved with solid waste activities. This workforce consists primarily of engineers and scientists. Specific information concerning waste collection and disposal workforce levels was not available. However, estimates based on disposal site permits indicate a disposal site operator workforce of approximately 130 persons.

Workforce increases are expected to involve the addition of eight professionals to the public solid waste workforce. This is expected to be in response to the implementation of the State solid waste management plan, and to federal legislation concerning the Resource Conservation and Recovery Act.

Although training needs have been identified, specialized training for solid waste personnel is not available.

Sources in the field have suggested that only through the provision of solid waste management training can an effective municipal solid waste management effort be developed. The Department anticipates an extensive training program for both municipal decision-makers and for operators of municipal solid waste disposal facilities, which presently is contingent on EPA funding.

VII. WASTE WATER

The Department of Environmental Conservation, Division of Water Programs, is the principal state regulatory agency responsible for the control and abatement of waste water pollution.

This section maintains a workforce of 18 people in waste water. These professionals include engineers, chemists, hydrologists, and laboratory technicians.

Private sector involvement in this area include both municipalities and The Alyeska Pipeline Service Company. The current workforce of municipalities can, at this point, only be measured through operator certificates awarded. There are 71 waste water treatment plant operators who have been certified and 90 who are working under contract with The Alyeska Pipeline Service Company.

Workforce projections show an increase of six professional positions at the public level over the next five years. Alyeska Pipeline Service Company expects to reduce their waste water workforce to approximately ten persons as construction activities are completed over the next five years.

Due to continued construction of new facilities and the modification of existing treatment facilities, job opportunities will be substantial for plant operators. Occupational upward mobility is expected to be made available through the mandatory certification program which was established in 1976. Certification is expected to provide a greater sense of professionalism to the operators in the field.

VIII. ENERGY

Within the Department of Commerce and Economic Development, the Division of Energy and Power Development has been established as the principal agency responsible for the development of a planned, integrated system of power development in Alaska.

At the present time, the energy program is staffed by five full-time professionals and supplemented by nine temporary positions. Volunteers are temporary personnel working through the federal ACTION program. In addition to the six temporary voluntary positions, one conservation specialist and two scientists are considered temporary positions.

Total full-time staff involves two social science professionals, one journalism professional, one civil engineer, and one Master's level economics professional.

Over the next five years, the Energy Office anticipates the addition of six professional positions. Specific future activities which are expected to necessitate additional workforce resources include energy conservation, fuel allocation, energy planning and analysis, and energy research and development.

At this time no training efforts have been developed. In the future, public education is expected to be a major component of the energy conservation program. Although specific training methods are not yet developed, planned efforts include motivation of consumer conservation, promotion of conservation guideline use in communities, and the provision of seminars on conservation technology application.

STATE OF ALASKA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR	15	16	18	19	20	20	6%
NOISE	1	1	3	3	3	3	n/a
PESTICIDES [1]	214	214	214	214	214	214	0%
POTABLE WATER [2]	8	16	17	18	18	18	22%
RADIATION	.5	.5	1	1	1	1	20%
SOLID WASTE [3]	8	11	14	14	16	16	16%
WASTEWATER [4]	18	20	21	23	24	24	6%
ENERGY	5	5	8	9	11	11	20%
TOTALS	269.5	283.5	296	301	307	307	3%

[1] The above includes 212 private sector workforce personnel.

[2] The above does not include private sector water treatment plant operators for which projections were not available.

[3] The above does not include 130 private sector solid waste disposal site operators for which projections were not available.

[4] The above does not include 161 private sector waste water treatment operators for which projections were not available.

EDUCATION

The subarctic climate and sparse population of Alaska result in unique academic and research potential. Some areas of the state are rapidly developing their natural resources, while major adjacent areas are essentially wilderness. This lends itself to controlled studies of the effect of man on his environment, a situation not available in most geographical areas of the country. Recent decisions on the Trans-Alaska Pipeline and the Alaska Native Land Claims Settlement have emphasized the need for maximum environmental control and protection.

The leading institution of environmentally-related programs is the University of Alaska. It consists of several senior and community level institutions as well as various related or affiliated research facilities, among them the Environmental Quality Laboratories, the Institute of Social and Economic Research, the Institute of Water Resources, and the Forest Soils Laboratory.

Academic programs available include Land Resources, Wildlife Management, Oceanography and Ocean Engineering, Water Resources, Mining Engineering, Civil Engineering, Arctic Engineering, Engineering Management and Science, Biology, Chemistry, and others.

In the State Report, two of the programs are examined in detail. The schools which are outlined include the University of Alaska, Fairbanks and Kenai Community College.

LEGISLATION

The environmental/energy legislation for Alaska was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Department of Environmental Conservation Act
Water, Air and Environmental Conservation Act
Operator Certification Law

National Environmental Energy
Workforce Assessment

Phase I

ARIZONA

State Summary

I. AIR

A professional and technical workforce of over 70 persons is engaged in air quality control in the Bureau of Air Quality Control (BAQC) and Bureau of Vehicular Emissions Inspection (BVEI) of the Arizona Department of Health Services (ADHS) and in seven local programs. An estimated 70 persons are employed by private industry to work in air pollution control, approximately 115 emission inspectors are employed by contractors to the BVEI, and 600 to 700 auto mechanics devote part-time to emissions inspection.

While the state estimates that 130 person-years of effort are necessary to carry on the SIP, no more than 60 persons are likely to be available from the BAQC and the BVEI. Projected annual workforce growth in the public sector over the next five years is minimal: 5 percent for the BAQC, none for the BVEI, and 10 percent for local programs. These projections represent a growth of about 37 total positions. To meet increasingly stringent air pollution regulations, the private sector workforce will grow by about 10 percent per year or by no more than 44 positions. Thus, fewer than 100 professionally and technically trained people will find job opportunities in the air pollution control field in the next five years.

The following training needs have been identified for air pollution control personnel: a) adjustment of emission control systems; b) communication and writing skills; and c) environmental law.

II. NOISE

There is a definite lack of activity in environmental noise control in Arizona at the present time. No noise legislation exists at the state level, although attempts have been made by the ADHS to obtain regulatory responsibility for noise control and to establish noise standards. Sources in the field anticipate that state noise legislation will be passed by the State Legislature in about five years. Currently, the Arizona Department of Transportation appears to be the only state agency involved in noise control. A staff of two civil engineers conduct noise studies for all highway construction projects in accordance with federal regulations. Four cities have municipal noise ordinances which are enforced by local law enforcement personnel, usually in response to complaints. Unless public awareness or national policy force the development of environmental noise control regulations, there will be little workforce growth in this area. If development in this field should occur, there will be a need for trained scientists, engineers, planners, systems analysts, attorneys, administrators, and technicians. Since little professional training and virtually no technical level training is presently available in the state, should this field expand, training programs will be necessary for involved personnel of all professions.

III. PESTICIDES

In the public sector in Arizona, at least seven state and county boards or departments are responsible for pesticide control. The state lead agency for the certification program is the Board of Pesticide Control, and the University of Arizona Cooperative Extension Service trains commercial and private applicators as well as pesticide advisors. In total, nearly 150 public sector professional and technical personnel are engaged in pesticide control activities. The Board of Pesticide Control estimates that 2,805 commercial applicators and 1,000 private applicators may need certification to achieve the requirements of federal and state legislation. In addition, 550 licensed pest control advisors serve as sales representatives for pesticide dealers and distributors, technical representatives for manufacturers, and public and private consultants.

While public sector sources anticipate some staffing growth as a result of FIFRA requirements, it appears that this growth will be limited. Growth that does occur will be primarily for degreed agricultural scientists or for persons with a knowledge of the pesticide industry to serve as field inspectors. Commercial applicators are projected to increase at a rate of no more than five percent per annum or about 100 per year. The stringency of FIFRA requirements may be responsible for restricting growth of commercial applicators.

IV. POTABLE WATER

The water supply regulatory program is administered by 15 professional and technical staff members of the Bureau of Water Quality Control (BWQC), ADHS. Eight of the 15 positions were filled in 1976 under an EPA grant pursuant to the Safe Drinking Water Act. Arizona has 745 treatment plant operators certified under the state's mandatory certification program. It is estimated that a total of approximately 1,000 persons work in the field of water supply in Arizona in the public and private sectors.

Sources at the BWQC indicate that a doubling of staff is necessary to adequately carry out the water supply program under the Safe Drinking Water Act, but because of insufficient state and federal funds, no further staff growth will occur over the next five years. More stringent enforcement of existing regulations combined with the requirements of the Safe Drinking Water Act will necessitate a significant increase in the number of certified treatment plant operators. All classifications of operator are projected to increase at an average per annum rate of 15 percent over the next five years or by 150 operators per year. Supervisory, maintenance, and laborer positions are also expected to increase as well as positions for chemist and laboratory technicians in state and private laboratories.

V. RADIATION

Most public sector radiation control activity is conducted by the Arizona Atomic Energy Commission (AAEC). The AAEC has a professional and technical staff of ten persons including health physicists and radiation control technologists. Comprehensive information regarding private sector workforce figures is not available. Field research suggests that there are at least 13 radiation control technicians, that is, persons who monitor personnel, plant facilities, work environment, and plant vicinity to detect and control radioactivity and/or radiation exposure and perform operation, analysis, and calibration of radiation monitoring equipment.

Workforce growth in radiation protection will result primarily from the planned construction of three nuclear generating stations by the Arizona Nuclear Power Project. The AAEC expects to grow by five persons over the next five years. New positions will be for chemists and physicists and a radiation control technologist. When the prospective nuclear power plants are operating, the workload of the AAEC may increase by 400 percent. In the early 1980s, when the nuclear power plants become operational, employees are expected to number about 300. Some of these persons will be involved in protection of the plant and external environment from radiation.

VI. SOLID WASTE

Because of the abundance of land in Arizona, land disposal of solid waste is the predominant disposal method, and resource recovery operations are limited. Currently, the state regulatory program, administered by the Solid Waste Management Section (SWMS) of the ADHS has a professional staff of two. Approximately 160 persons work at the state's 144 approved landfills in such positions as weighmaster, heavy equipment operator, foreman, and spotter. It is estimated that 1,500 persons may be engaged in solid waste collection.

The SWMS anticipates increasing its staff to nine positions by 1981. New positions will be for hydrologists, chemists, and sanitarians to expand the section's enforcement, technical assistance, and hazardous waste management activities. No workforce growth will occur in collection, and it is likely, in fact, that this workforce will decrease as more capital intensive technology reduces the traditional three-person crew to one-person. The workforce in disposal will grow slowly over the next five years at a projected per annum growth rate of three percent, thus yielding a total increase of about 23 people. The rate of turnover of the workforce in disposal may be as high as 30 percent per year for heavy equipment operators and spotters because of frequent injuries, low pay, and little opportunity for advancement.

VII. WASTE WATER

The Arizona Department of Health Services, Bureau of Water Quality Control has regulatory responsibility for both the waste water pollution control and water supply programs. A total of 17 professional and technical personnel are involved in the waste water pollution control program. The position of engineer predominates the program. Officials indicate that the bureau has a need for a doubling of staff to effectively carry out its functions. However, due to inadequate funding, no additional positions are expected to be authorized in the next five years.

There are currently a total of 532 certified operators employed in waste water treatment facilities. Sources indicate that more stringent enforcement of existing state and federal regulations combined with plant construction and modifications and changes in treatment technology will result in the need for more and better trained certified treatment plant operators over the next five years, with an average annual increase of 25%. This translates into a growth of approximately 214 persons per year.

There will also be an increased demand for other waste water treatment personnel in such areas as administration, maintenance, and general labor. There may also be some growth in the number of laboratory personnel required. However, specific workforce projections for these areas cannot be made from the available information.

VIII. ENERGY

The Arizona State Government has three principal energy-related organizations: The Office of Economic Planning and Development, Planning Division, Energy Programs Section; the Arizona Solar Energy Research Commission; and the Interagency Energy Planning Office.

The Energy Programs Section has a staff of six professionals which includes a fuel allocation officer, two natural gas project members, and two conservation planners. The Section expects to experience no growth over the next five years, and in fact, may lose three positions if federal funding ceases.

The Arizona Solar Energy Research Commission has a professional staff of three persons: the executive director, a deputy director, and a public information coordinator. Authorization for ASERC expires in 1978, but sources expect that authority for the Commission will be renewed.

The Interagency Energy Planning Office has a membership of 20 representatives. This office does not have a supporting staff.

Specific workforce figures for the private sector are not available. However, sources in the field argue that significant growth will occur in solar and other energy development such as geo- and hydro-thermal in approximately three to five years.

STATE OF ARIZONA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	252	268	278	288	300	313	4%
NOISE[2]	2	2	2	2	2	2	0
PESTICIDES	7,511	7,666	7,821	7,977	8,133	8,289	2%
POTABLE WATER[3]	760	909	1,058	1,207	1,356	1,505	15%
RADIATION[4]	10	10	10	12	14	15	9%
SOLID WASTE[5]	2	4	7	8	9	9	n/a
WASTEWATER[6]	547	761	975	1,189	1,403	1,607	24%
ENERGY[7]	9	9	6	6	6	7	n/a
TOTALS	9,093	9,629	10,157	10,689	11,223	11,747	5%

[1] This estimate does not include the 600-700 mechanics involved with private sector emissions control.

[2] This estimate includes projections for the Department of Transportation; no information is available on the private sector workforce.

[3] The above figure includes estimates for the state agency and for water treatment plant certified operators.

[4] The above does not include private sector projections.

[5] The above includes only state agency estimates. Private sector information is limited, and currently includes an estimated 144 landfill owner/operators, 99 heavy equipment operators, 10 weighmasters, 9 foreman, 23 spotters, and 19 others. Minimal growth is projected during the coming five years.

[6] The above estimate includes only the personnel projections for the state lead agency and the water treatment plant certified operators.

[7] This estimate includes information on the state agencies. Limited data are available on the private sector.

EDUCATION

Environmentally related education programs are available only on a limited basis in Arizona. Northern Arizona University offers a Bachelor of Science degree in Environmental Studies. This program represents an interdisciplinary program effort, which has been designed to prepare students for environmental science vocations in government, industry, and teaching. The Division of Agriculture of Northern Arizona University offers both a B.S. and M.S. degree in Environmental Resources in Agriculture.

Pima Community College District is designing a curriculum for one-year certified wastewater treatment plant operator training. This program is being developed with the intent of replicating the curriculum in any Arizona community college interested in implementing such a program.

Phoenix College has a well-developed Water Treatment Training Program. The college offers both a certificate and A.A.S. degree. This program has been operable since 1965.

Other than the programs mentioned, environmental education programs are rare. Many colleges and universities in the state offer individual courses in ecology, man and his natural environment, and environmental science; however, little in the way of comprehensive environmental program majors is available.

LEGISLATION

The environmental/energy legislation for Arizona was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Planning Office Act

Air Pollution Control Act

Mandatory Annual Emissions Inspections of Motor Vehicles

Motor Vehicle Emissions Inspection Facilities

Air Pollution Control Devices

Assumption of Jurisdiction Over Indian Lands for Air Pollution Control

Mufflers Prevention of Noise and Air Pollution

Arizona Pesticide Act

Pesticide Use and Application Law

Structural Pest Control Law

Control of Ionizing Radiation Law

Public Dumping Grounds Law

Solid Waste Management Plans Law

Sanitary Districts Law

Water Pollution Control Act

Arizona Solar Energy Research Commission Law

National Environmental Energy Workforce Assessment

Phase I

ARKANSAS

State Summary

I. AIR

There are four major economic activities in Arkansas: agricultural, wood products operations, mineral processing, and petrochemical processing. All of these activities contribute to air pollution problems in Arkansas in the form of excessive emissions of particulate matter such as smoke and dust.

Under the Arkansas Water and Air Pollution Control Act, authority for the administration of the air quality program has been allocated to the Department of Pollution Control and Ecology, the Division of Air Pollution Control. There has been no responsibility delegated at the local level for air quality control.

In the private sector of Arkansas, industry has organized the Arkansas Federation of Air and Water Users in order to inform the members of proposed revisions to existing environmental standards, and the establishment of new performance standards. The Federation has estimated that 200 to 250 people are involved in air abatement programs in the state.

From the available information it appears that the professional field will increase at an annual rate of approximately three to five percent. The positions will be primarily at the degreed or higher levels in most situations, e.g., engineers, chemists, attorneys. Increased regulatory and control activities could diversify career opportunities.

II. NOISE

Currently there is no state agency in Arkansas which has been designated with the responsibility for noise pollution control and abatement. The major responsibility for environmental noise control has been allocated to the local level.

The state level workforce assigned noise pollution control and abatement responsibilities is non-existant at present. On the local level the workforce is predominantly composed of law enforcement personnel. However, estimates on the part of other Arkansas environmental control personnel state that approximately 20 persons statewide are involved in noise control on a full-time basis. Law enforcement personnel, of course, have other responsibilities aside from the noise field. Industrial personnel have estimated that a seven percent per annum increase in noise control personnel will occur to 1982.

The career opportunities in the field of noise control in Arkansas are exceedingly limited. These options will continue to be quite scarce over the next few years. Career potentials are not expected to improve during this period. However, increased regulation and public awareness will result in a need for specialists and for program development leading to more careers in the less than degreed technical areas.

III. PESTICIDES

In Arkansas, the State Plant Board which is part of the Department of Commerce, has been designated as the state lead agency for the administration of the pesticides program. Several agencies cooperate with the Plant Board and include Arkansas Cooperative Extension Service, Department of Pollution Control and Ecology, Arkansas Game & Fish Commission, State Department of Health, State Forestry Commission, and the University of Arkansas.

Across the state, there are approximately 64 persons at the state level and 25,500 applicators including the private sector which is composed of farmers and ranchers for the most part.

Although the areas of responsibility are increasing rapidly insofar as pesticides registration and certification are concerned, there are few personnel increases which are anticipated for the State Plant Board. A two percent per annum growth is anticipated for this staff. The pesticides personnel other than the private applicator (the farmer) should experience a three percent per annum increase to 1982.

A number of disciplines which will necessitate varying technical skill competencies, as well as those which will require longer educational programs, will be needed. There will also be a need for professional level training in less specialized areas since pest control extends into the areas of water, solid waste and air.

IV. POTABLE WATER

Arkansas is a water rich state with five major rivers including the Mississippi. Overall, drinking water is considered to be of good quality. Pursuant to Arkansas state law, the Department of Health, Bureau of Public Health Engineering, has been designated as the agency with primary responsibility for drinking water in Arkansas.

The Arkansas workforce includes approximately 64 persons at the state level. There are approximately 750 certified operators in three classification categories. The turnover rate in the operator field has been reported at 10% to 15% per annum. Minimal increases in personnel are projected to 1982.

It would appear that the primary problem relative to increases in state staff are in the area of salary. The salary scales are ordinarily the hindrance to acquiring properly trained new entrants.

Operating personnel will continue to experience high turnover rates until salaries and upward mobility as well as job security are improved. Upgrade training will be a necessary requisite for operators in the next three to five years.

Career opportunities should be available at the degreed and non-degreed level. Operators will require increasing knowledge and skills as water treatment and distribution plants become more technologically complex.

V. RADIATION

Radiation control is not new to the State of Arkansas. In 1963, Arkansas became one of the earliest states to enter into an agreement with the Nuclear Regulatory Commission (NRC).

The Arkansas Department of Health, Bureau of Environmental Health Services, Radiological Section has been designated as the state lead agency for radiation control. The program includes several major areas of involvement. As an agreement state, Arkansas must conduct inspections of licensed facilities every two years. The Radiological Section responsibilities are categorized into medical/dental X-ray activity, non-healing arts X-ray, and particle accelerators.

The total statewide number of persons occupationally involved in radiation control has been estimated by Health Department officials to be approximately 500. This includes approximately 35 state level personnel. A five percent growth per year can be expected at both the state and private sector.

Career opportunities will be available at the state level and also to a greater degree within the private sector in industry. Academically trained personnel with a degree in the engineering and science fields will define the largest percentage of the occupational categories which should be available to 1982. Radiation and nuclear expertise as well as computer training will represent some of the job skills which will be in demand in Arkansas.

VI. SOLID WASTE

Solid waste is a problem in Arkansas which requires the efforts of public relations and educational personnel to inform the citizenry regarding health and environmental hazards. State personnel feel there are still far too many examples of private citizens improperly disposing of garbage. Great strides have been made, however, in the area of solid waste management in Arkansas.

The Department of Pollution Control and Ecology, Division of Solid Waste Control, has been designated as the lead agency for the State of Arkansas solid waste management program. The Division administers the program under the Arkansas Solid Waste Management Act of 1971 and consists of 8 persons. The Department of Health, Bureau of Public Health Engineering contributes technical assistance to the Solid Waste Control program in the form of four public health inspectors. Solid waste management personnel statewide number approximately 650 to 660 according to experts in the field.

The state level solid waste management program should experience increases in staffing levels to 1982. Statewide personnel will also increase during this period.

There are a number of fields requiring both technical and professional level training which may develop in the future as solid waste activities become more diversified and complex. These positions will be a consequence of the Resource Conservation and Recovery Act and, to a lesser extent, the ramifications of the Toxic Substances Act.

VII. WASTEWATER

Arkansas waters may be described as of exceedingly high quality on one hand and highly degraded on the other. Usually these variations are attributable to the geographical region the state.

Primary responsibility for waste water has been allocated to the Department of Pollution Control and Ecology, Division of Water Pollution Control. The Division personnel assigned to wastewater number 36 and the statewide workforce is estimated at 1,300. Increases in the workforce are estimated at three to five percent per annum.

Careers will be available at the state level. Also, at the municipal level and in the industrial sector operators will be required. Wastewater treatment plant personnel will require increasing upgrade training over the next five years as technological advances are made in treatment techniques.

Overall, the pollution of Arkansas waters may be considered a reversible process. Application of wastewater treatment to municipal and industrial point source discharges and curtailment of non-point source discharges are the major components of the state's abatement program. Strict enforcement through education and surveillance will prevent future degradation of the state's waters.

VIII. ENERGY

Numerous energy companies are exploring possibilities of developing the vast lignite resources in the State of Arkansas. There are many pollution control aspects to be considered prior to the development of these resources, however. Land reclamation is an uppermost consideration.

There are two offices in Arkansas with energy related responsibilities. The Arkansas State Energy Office and the Department of Pollution Control and Ecology have been identified for purposes of this study.

The Arkansas State Energy Office has as its major purpose the development of an energy policy for the state. The Department of Pollution Control and Ecology maintains an Environmental Preservation Division which is primarily responsible for proposing recommendations regarding major projects which are planned for the state. These projects include river channelization and nuclear power plant construction, as well as others.

Professionals from both energy related offices have stated that the total number of people involved in energy pollution control and abatement, as well as conservation activities, is approximately 650. Increases should occur at a rate of three percent per annum to 1982.

Opportunities for careers in the energy field will be available in Arkansas on the degreed level. Post graduate training in certain areas such as nuclear power will be necessary.

STATE OF ARKANSAS - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)
(estimated)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR	250	260	270	281	292	303	4%
NOISE	20	21	22	24	26	28	7%
PESTICIDES[1]	5,564	5,675	5,789	5,905	6,023	6,143	2%
POTABLE WATER	814	847	881	916	953	991	4%
RADIATION[2]	535	562	590	620	651	684	5%
SOLID WASTE	862	908	954	1,002	1,051	1,103	5%
WASTEWATER	1,361	1,413	1,466	1,528	1,585	1,645	4%
ENERGY	660	680	704	729	753	777	3%
TOTALS	10,066	10,366	10,676	11,005	11,334	11,674	3%

[1] The above does not include private applicators but does include commercial applicators.

[2] The above includes some 500 persons involved in the usage of radioactive materials.

EDUCATION

The State of Arkansas offers very few environmentally related post-secondary educational programs. The major share of these programs, however, are located within the University of Arkansas system. The University of Arkansas owes its origin to a public land grant of the Federal Congress which was accepted in 1871. Subsequently, the College of Agriculture and Home Economics was established at Fayetteville, Arkansas. Today, the Bachelor of Science in Agriculture (B.S.A.) may be conferred upon a student upon successful completion of 132 semester hours through the College. Another program is available with an Environmental Science major. This degree is the result of an intercollege program in Environmental Sciences.

The University of Arkansas at Little Rock has developed a program which offers a Bachelor of Science degree in Environmental Health. This program is a cooperative effort which involves the University and the Arkansas State Board of Health, the Arkansas Department of Pollution Control and Ecology, County Health Departments and the Little Rock and North Little Rock City Health Departments. The curriculum was developed with the assistance of the Association of Arkansas Registered Professional Sanitarians and follows the guidelines establisned by the National Association of Sanitarians.

LEGISLATION

The environmental/energy legislation for Arkansas was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Water and Air Pollution Control Act
Pesticide Use and Application Act
Solid Waste Management Act
Solid Waste Facilities Finance Authorization Act
Wastewater Licensing Act
Open Cut Land Reclamation Act

National Environmental Energy Workforce Assessment

Phase I

CALIFORNIA

State Summary

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I. AIR

The California Air Resources Board is responsible for the control of vehicle emissions and for a coordinated state and local program of air pollution control. The Board is currently staffed with 405 persons: 34 administrators, 126 engineers, 2 attorneys, 41 scientists, 63 technicians, 81 other, and 58 clerical. The Board anticipates some growth during the next five years, with an average annual increase of 8 percent.

There are a total of forty-one local air pollution control boards staffed and operating in California. The boards are currently staffed with 941 persons. This number includes engineers, inspectors, attorneys, sanitarians, technicians, chemists, data processing specialists, public information specialists, pollution control specialists, meteorologists, instrumentation specialists, and others. The local air pollution control agencies predict steady but limited growth in staff requirements during the next five years, with an average annual increase of 2 percent.

Limited information is available on the private sector. There are 1,637 major installations in the state; it has been predicted that most of these installations have air pollution control components, however, no staffing estimates are available. Private industry predicts from 1 to 2 percent per annum growth during the next five years.

II. NOISE

The California Office of Noise Control maintains primary responsibility for noise pollution control and abatement regulatory functions; however, other agencies involved in noise control include the State Highway Patrol, the State Housing and Community Development Commission, the California Department of Transportation, and the Attorney General's Office.

The Office is currently staffed with five professional and two clerical positions. The professionals include three engineers, one architect, and one psychoacoustician. The Office predicts that staffing requirements for the program will approximately double by 1981, with a minimum of three professional positions.

The other agencies involved in noise control employ approximately 238 professionals. The professionals have backgrounds and experience as highway patrol officers, engineers, chemists, sanitarians, statisticians, compliance specialists, planners, engineering technicians, and aviation specialists. Growth in the agencies will be minimal during the next five years.

Within the private sector, there are approximately 175 to 200 persons involved with aspects of noise programs within the counties and municipalities. Occupations include engineers, industrial hygienists, police officers, field inspectors, and consultants. Minimal growth is anticipated in the private sector.

III. PESTICIDES

The California Department of Food and Agriculture is the principal pesticide regulatory and control unit in the state. Two administrative units within the department have pesticide related programs: the Agricultural Chemicals and Feed Division and Pesticide Residue Laboratory. The Agricultural Chemicals and Feed Division is currently staffed with 84 persons: 48 in state headquarters and 36 in district offices. Most positions are filled by persons with backgrounds in chemistry, entomology, plant pathology, agricultural education, and biology. The Pesticide Residue Laboratory is staffed with 14 chemists.

Other state agencies involved with pesticide programming include the Pesticide Investigation Laboratory, the California State Extension Service, and the Pesticide Education Coordinating Unit. These agencies employ an additional 159 persons who have some responsibility for pesticide programs. Limited growth is anticipated in these state agencies during the next five years.

In addition to the above staff, there are 192 part-time county agricultural extension specialists, 7,000 commercial applicators/operators, 700 agricultural pest control advisors, and 65,000 farmers. Substantial growth is anticipated for the private sector. Experts within the area indicate that there may be as much as 5 to 15% increase in the workforce requirements per annum during the next five years.

IV. POTABLE WATER

The Sanitary Engineering Section of the Department of Health has the administrative responsibilities for the potable water programs for the State of California. The Section is currently staffed with 68 persons: 57 professional/technical positions, 9 clerical positions, and 2 temporary workers. As a general rule, the professional have backgrounds in engineering. The staff devotes only 70 percent of their time to domestic water supply regulation. No growth is projected for the Section during the next five years.

The 53 county health departments have some responsibility for potable water programs. Workforce statistics for the departments are sketchy; however, it is estimated that each department has from one to five persons with some responsibility in water supply. No growth is projected for the next five years.

Little information is available on the private sector workforce. The Sanitary Engineering Section maintains records only on the number of certified system operators. There are 5,279 operators currently certified. A partial survey of water treatment facilities within the state revealed that the crew size and composition varied according to locality. The largest facility in the United States is the Department of Water and Power of the City of Los Angeles. The facility currently employs 10,454 persons. No growth is predicted in the private sector during the next five years.

V. RADIATION

The principal function of the Radiologic Health Section of the California Department of Health is the elimination of unnecessary and unproductive man-made radiation. The Section is currently staffed with 31 professional/technical positions and 22 clerical positions. The Section anticipates adding from five to six persons to the staff during the next five years. Three of the positions will be added to the X-ray inspection program, and two of the positions will be used to expand the X-ray licensing program.

The Bureau of Occupational and Radiation Management of the Community Health Services Agency in Los Angeles operates an environmental radiation satellite program. The program is staffed with nine professional/technical positions and three clerical positions. The Bureau predicts a maximum growth of two positions during the next five years: one radiation protection specialists and one health physicist.

Private sector workforce statistics are varied. A report published by ERDA on the nuclear related technician workforce indicated that 7,297 persons are involved in private sector occupations. In addition, the Radiologic Health Section indicates that there are approximately 156 health safety officers employed at clinics, 156 safety officers and assistants employed at academic institutions, 71 Civil Defense instructors, and an undetermined number of employees in the 805 industrial users. Statistics support a 5-10% per annum growth rate in the private sector through 1981.

VI. SOLID WASTE

The Solid Waste Management Board, the state lead agency for solid waste related programs, is currently staffed with thirty-five professional/technical positions: 9 engineers, 6 administrators, 6 solid waste specialists, 4 resource economists, 2 planners, and 8 student assistants. The majority of the professionals have training in engineering, physical science, or economics. Activities of the Board are supported through the efforts of 10 clerical employees.

The Solid Waste Management Board anticipates major growth in its staff during the coming five years. During 1977, the Board predicts a 100% increase in staff, and from 1977 to 1982, the Board estimates an annual average growth rate of 27%. This rapid growth is related to the Board's increased program responsibilities under the emerging resource recovery program and the technical assistance program to the counties.

No information is currently available on the number of employees working in the sanitary landfills, hazardous waste sites, or collection systems. Moderate growth is predicted within the private sector during the next five years. The exact amount of annual growth cannot be accurately determined. Any increase will be directly related to population growth and industrial expansion.

VII. WASTEWATER

The environmental wastewater regulatory agency for the State of California is the State Water Resources Control Board. The Board employs a total of 496 professional/technical positions and 190 clerical positions. Professional occupations include 65 administrators, 54 biologists, 278 engineers, 30 engineering technicians, 53 analysts, 15 attorneys, and 1 operations specialist. The Board expects only limited growth during the next five years, with an average annual increase of no more than 1 percent.

Other state and regional agencies involved with wastewater programs include the California Department of Fish and Games Laboratory, the Marine Bio Assay Laboratory, the San Marcos Training Center, five community colleges, and seven regional planning commissions. Cumulatively, they employ an estimated 167 persons in wastewater related programs. Minimal growth is projected through 1981.

There are approximately 735 municipal wastewater treatment plants in the state that employ an estimated 7,655 persons. This includes 4,000 operators and 3,655 others. The other category consists of administrators, chemists, and maintenance persons. During the next five years, an average annual growth of 5 percent is predicted. In addition, there are 750 individual plants in the state, 250 of which operate waste treatment facilities. The crew size in the facilities range from two to three persons. An average annual growth of from 5 to 10 percent is predicted for the industrial wastewater program.

VIII. ENERGY

The California State Energy Resources Conservation and Development Commission is the principal energy program coordinating agency for the state. The commission is staffed with a total of 573 persons including administrators, scientists, economists, lawyers, and planners. During the next five years, the commission does not anticipate any major growth in its staffing requirements.

Each of the utility companies in the state has an environmental workforce; however, complete information on the extent of this workforce is not currently available. Data were, nevertheless, collected on two of the state's major utilities: Southern California Edison Company and the Pacific Gas and Electric Company. Pacific Gas was able to identify 165 persons with direct environmental responsibilities. Sources at the company indicated that an undetermined number of persons provide additional supportive services to the environmental effort. Southern California Edison has an environmental component under its Environmental Planning Department. The Department is staffed with 21 full-time persons. Additional support is provided through a minimum of four other departments in the company. No estimate was available on the number of persons involved in environmental activities within these departments.

While the public sector workforce is predicted to remain reasonably stable, major growth is projected for the private sector during the next five years. The exact amount of growth cannot be accurately determined at present.

STATE OF CALIFORNIA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR	1346	1440	1492	1538	1585	1633	4%
NOISE[1]	238	247	247	247	247	252	1%
PESTICIDES[2]	237	245	253	261	269	280	3%
POTABLE WATER[3]	5347	5347	5347	5347	5347	5347	0%
RADIATION	7720	8450	9238	10100	11044	12078	9%
SOLID WASTE[4]	35	70	76	84	91	98	27%
WASTEWATER[5]	8151	8345	8943	9339	9738	10136	4%
ENERGY[6]	573	573	573	573	573	573	0%
TOTALS	23647	24717	26169	27489	28894	30397	5%

[1] Figures include projections for public sector only; they do not include the 175-200 private sector employees.

[2] These estimates do not include the estimated 192 part-time extension agricultural farm advisors, the instructional staff at commercial colleges who may become involved in pesticide training, the 7,000 commercial applicators/operators, 700 agricultural pest control advisors, 65,000 farmers, or the 18-25 seasonal employers at the Pesticide Investigation Laboratory.

[3] These figures include only state staff and number of certified operators. They do not include operators at municipal systems, or the employees of the 53 local health departments who have potable water related tasks.

[4] The above does not include private sector workforce statistics.

[5] The above does not include persons employed or contracted under 208 Planning in Regional Planning Commissions, the 12 professionals at the California Fish and Games Laboratory, 21 employed at the Marine Bio Assay Laboratory, 5 employees at the San Marcos Training Center, 9 instructors at community colleges, and the undetermined number of employees at the 250 industrial wastewater treatment facilities.

[6] The above includes information on the state lead agency only. The growth was calculated on a simple percentage basis.

EDUCATION

Environmental education programs are offered in numerous state universities, colleges, community colleges, and technical schools. Advanced degree programs are offered through the University of California at Berkeley, the University of California at Irvine, California State University at Sacramento, California State University at San Jose, and Stanford University.

Advanced degrees in Environmental Engineering are available through the University of California, Irvine; California State University, San Jose; and Stanford University. The University of California at Berkeley offers both masters and doctoral degrees in Sanitary Engineering. A Masters of Science in Engineering degree is awarded by the California State University, Sacramento, for course work in Civil Engineering with an environmental emphasis.

The California State Water Resources Control Board operates a comprehensive wastewater treatment training program through the San Marcos Training Center. The Center currently offers fifty courses; however, not all courses are available during a given quarter.

Wastewater and potable water operator training programs are also available through five community colleges in the state: Orange Coast, Santa Ana, Contra Costa, Sacramento City, and Sierra. Others of the 106 state community colleges offer sporadic environmental training programs; however, minimal information is currently available on these programs.

LEGISLATION

The environmental/energy legislation for California was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Quality Act of 1970
Air Pollution Control Laws
Motor Vehicle Code Air Pollution Provisions
Pollution Control Financing Authority Act
Noise Control Act of 1973
Pest Control Operations-Agricultural Code
Water Systems and Operators Law
Radiation Control Law
Hazardous Waste Law
Beverage Container Law
Solid Waste Management and Resource Recovery Act
Porter-Colgne Water Quality Control Act
Coastal Zone Conservation Act of 1972

National Environmental Energy Workforce Assessment

Phase I

COLORADO

State Summary

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I. AIR

The outstanding environmental pollution problem in the State of Colorado is air quality degradation. The state has been divided into eight Air Quality Control Regions (AQCR). Priorities have been assigned for the control of each major pollutant in each of the AQCR's. Pollutant priorities determine the amount and type of control and abatement program emphasis allocated to each region.

Primary responsibility for air pollution control is assigned to the Air Pollution Control Commission, and program implementation has been delegated to the Colorado Health Department, Air Pollution Control Division.

Colorado's air quality program will increase staff over the next three to five years. This increase may be in the form of departmental interdivisional transfers. However, air quality is a priority item in the state and among the citizenry, and substantial cutbacks in this workforce are unlikely. The number of air quality personnel across the state in the local and especially in the industrial sector should increase at a four to seven percent per annum rate. Positions will be primarily at the degreed levels. Increased regulatory activities could diversify opportunities, and there may develop a substantial need for individuals trained in short-term technical courses provided by state, federal, or vocational programs.

II. NOISE

Although the Colorado Department of Health has been identified as the lead state agency for noise pollution control and abatement, the state law also assigns responsibility for noise to the counties and, specifically, to the municipalities. Standards for environmental noise have been established by the state legislature, and twelve municipalities across the state have established regulations.

The Occupational and Radiological Health Division of the Department of Health currently has three persons assigned to environmental noise control. Estimates have been made that approximately fifteen persons are occupationally involved in noise control across the state.

Professionals in the field have estimated minimal increases in the workforce in the area of noise control. At the state level, as well as the local level, increases are not anticipated to exceed five percent per annum.

Currently, there is little evidence that a significant number of career opportunities will develop over the next three to five years. This may be credited to the fact that environmental noise pollution control has not as yet developed as a distinct professional area. Currently, there is very little interest in the field. Environmental engineers and health physicists in both the public and private sector will be required for the limited number of openings which are anticipated.

III. PESTICIDES

Colorado, as an agricultural state, has designated the Department of Agriculture, Plant Industry Division, as the lead pesticide agency. Division personnel number approximately 10; the commercial applicators are estimated at 2,763; and the private applicators, composed for the most part of farmers and ranchers, number approximately 17, 500.

The state staff may experience an estimated per annum increase of approximately four percent while the commercial applicators are anticipated to experience a per annum increase of approximately two percent. Private applicators, on the other hand, will experience a slight decline.

There has been a slight decrease in the number of firms licensed to do structural work in Colorado. Other areas of decline include aerial operators, licensed ground applicators, and pieces of equipment used. Within the state, the number of companies registering products also is declining. Employment opportunities should be available, however, over the next three years,but these career options may be limited.

The state has an ongoing Integrated Pest Management Program (IPM). This program began as a single purpose program in order to produce the Oriental Fruit Moth. Today, parasites are produced to assist in Thistle, Alfalfa Weevil and Dutch Elm Disease control.

IV. POTABLE WATER

Colorado is experiencing rapid growth in some metropolitan areas due to in-migration, and energy development has affected several communities. Expansion of cities and industrial growth have placed an increasing strain on water supplies. Water quantity will remain a problem for some time.

The Colorado Department of Health, Water Quality Control and Public Health Engineering Division, has been identified as the lead agency. Workforce increases are anticipated; the state level may demonstrate an average 5 percent per annum increase over the next three to five years, while the operator category growth is projected to average 6 to 12 percent per annum.

Career opportunities will be available to non-degreed personnel at the operator level. The Department of Health personnel estimate that there will be substantial increases in the number of water supplies, thereby creating openings for operators. At the degreed level, there will be career opportunities for engineers, biologists, and chemists. The following positions should be available over the next three to five years: chemical engineer, industrial hygienist, sanitary engineer, and laboratory personnel.

The growth and expansion of Colorado's cities and the proliferation of industry has and will continue to place even greater responsibility on the state to maintain the purity of drinking water, the life blood of the state.

V. RADIATION

Within the borders of the State of Colorado are numerous sources of natural and man-made radiation. The Legislature has charged the Colorado Department of Health, Occupation, and Radiological Health Division with the responsibility for assuring that occupational exposure, environmental contamination, and public exposure to radiation is kept at as low a level as practicable. The Department has an extensive registration and inspection program for medicine, industry, and research. There are approximately 38 persons occupationally involved in radiation control employed by the state and about 5,260 persons across the state who are employed in radiation related activities.

State level personnel requirements are expected to increase at approximately 2 percent per annum, while the private sector and other non-state personnel requirements are anticipated to increase at an average 4 to 6 percent per annum rate.

Career potential appears to be good in the area of radiation control. Emphasis on nuclear energy is generating personnel needs that require expertise in engineering, science, and technology. Health physicists should have job opportunities.

Radiation use will probably continue to proliferate in Colorado. Mining, milling,and nuclear generating endeavors within the state will present new and varied challenges to personnel involved in radiation control.

VI. SOLID WASTE

The primary responsibility for solid waste management in Colorado has been allocated to the Department of Health, Engineering Division, which has recently been consolidated with the Water Division. It is the responsibility of this Solid Waste Management Section, under the Solid Waste Act, to regulate and control solid waste sites and facilities.

Solid waste management personnel will increase over the next three to five years across the state. At the state level, a growth rate of approximately 15 percent per annum is anticipated. With new solid waste management legislation, however, these estimates could increase four to five times. An average of 10 to 12 percent per annum increase in operating and supervisory personnel should occur statewide.

One major thrust of the Colorado solid waste management program consists of an ongoing effort directed toward the preparation of an inventory of hazardous waste sources. A second major endeavor of the program involves the closing or conversion of sites which currently are not in compliance. Presently, there are 250 sites within the state, and 60 percent of these are in compliance.

Hazardous materials and toxic substances are presently stored on home-sites or disposed of outside the state. Increased challenges will emerge in the program as problems involving such substances are addressed.

VII. WASTEWATER

The Colorado Water Quality Control Act is administered through the Colorado Department of Health, Water Quality Control and Public Health Engineering Division. There is also a Water Quality Control Commission.

Approximately 1,019 persons across the state are involved in the area of wastewater control. The wastewater operator turnover rate has been estimated to be as high as 65 percent. The workforce allocated to this environmental control area is forecast to increase over the next three to five years. State level personnel requirements should increase approximately 2 percent per annum, and operating personnel requirements will increase at a per annum rate of approximately 7 to 13 percent.

There are a number of skill areas and degreed positions which are presently accessible to those entering the field. Automation will certainly have its effect, and all indications point to a gradual expansion of the wastewater control field.

The potential for careers will depend on fiscal commitment to future needs and on regulations which will establish standards for treatment facilities. The advent of increased strip mining activities will have further effects overall. In the professional, degreed areas, there will be a continuing but gradual expansion of workforce requirements for individuals in the sciences and engineering.

VIII. ENERGY

The State of Colorado has an abundance of wide seamed, low sulfur coal, and the largest contained oil shale area in the world lies under Colorado and surrounding states. Uranium deposits are substantial. Energy resources in most forms are abundant across the state. These resources result in vast economic benefits, but tapping them may generate environmental disruptions. Pollution control and abatement activities related to the development of energy resources is not a new undertaking within Colorado. While development of resources at once with protection of Colorado's environment seem to represent divergent points of view, a spirit of conciliation and cooperation is demonstrated.

The following energy related problems have been identified: conservation; the depletion of fossil fuels; alternative energy sources; mass transportation; and, needs for changes in life style and philosophy on the part of the citizenry regarding energy.

There are two major agencies with designated responsibilities in the area of state energy activities in Colorado. These agencies are: the Governor's Energy Policy Council and the Colorado Energy Research Institute (CERI). The number of energy related personnel involved in pollution control and abatement activities statewide is not available at present. Increases will occur, however, in the statewide workforce to 1982.

STATE OF COLORADO - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)
(estimated)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR	137	144	151	159	167	175	5%
NOISE	18	19	20	21	22	22	4%
PESTICIDES[1]	2,775	2,831	2,888	2,946	3,005	3,065	2%
POTABLE WATER	1,482	1,601	1,729	1,867	2,016	2,177	8%
RADIATION	5,300	5,512	5,732	5,961	6,199	6,447	4%
SOLID WASTE	247	272	299	328	361	397	10%
WASTEWATER	1,019	1,080	1,145	1,214	1,287	1,364	6%
ENERGY	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TOTALS	10,978	11,459	11,964	12,496	13,057	13,647	4%

[1] Does not include private applicators.

EDUCATION

In the State of Colorado there are several institutions which offer degrees in environmental programs. A larger number of higher education institutions offer environmentally related courses which are not directed to a specific degree.

Colorado State University at Fort Collins presents an interdisciplinary studies program in general environmental studies. This program allows students to concentrate electives from a list of approved courses emphasizing environmental issues and alternative problem solutions. This program does not lead to a degree. The courses, however, can be used in meeting the requirements for a Bachelor's degree.

The University of Northern Colorado at Greeley historically has emphasized the preparation of students for careers in education. The University offers 31 hours of intensive environmental studies representing an interdisciplinary approach to complex environmental problems. The courses are utilized as electives to the general educational curriculum requirements.

Environmental education is well represented at Colorado's institutions of higher education. In the State Report, programs are described including Adams State University and the Community College of Denver at Red Rocks. These two institututions are presented as representative of environmentally related educational offerings in Colorado.

LEGISLATION

The environmental/energy legislation for Colorado was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Air Pollution Control Act of 1970

Noise Abatement Law

Commercial Pesticide Applicators Act

Pesticide Act

Water and Waste Water Treatment Plant Operators Law

Radiation Control Law

Solid Wastes Disposal Sites and Facilities Law

Individual Sewage Disposal Systems Act

Water Quality Control Act

National Environmental Energy Workforce Assessment

Phase I

CONNECTICUT

State Summary

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I. AIR

The Air Compliance Unit of the Connecticut Department of Environmental Protection is responsible for implementing the state provisions of the Clean Air Act of 1970. The program is primarily staffed with air pollution control engineers and technicians, field inspectors, and environmental protection maintainers. The air program has decreased in staffing in one year from 134 full-time personnel to the current level of 104.

For fiscal year 1978, the program is requesting 26 positions to replace some of those lost during 1976. Most of those hired will probably be air pollution control engineers.

The most promising area for the development of new careers will be in the non-degreed vocational workforce. EPA has funded a program in Connecticut to incorporate motor vehicle testing techniques into vocational high school curriculum. Currently, Connecticut has a program which will address the problem of motor vehicle air pollution called the Connecticut Transportation Control Plan. The mandatory inspection and maintenance of emission control equipment, if implemented, should result in a significant demand for non-degreed inspection and maintenance personnel. It is hoped that when inspection and maintenance plans become effective, a trained workforce will be available for immediate implementation of the plan through a training program targeted for vocational education high schools.

II. NOISE

The Noise Compliance Unit of the Department of Environmental Protection (DEP) is authorized to develop controls on environmental noise through regulation and restriction of the use and operation of stationary noise sources. Upon request, consultant services are provided to officials from communities who are revising or developing noise ordinances. Local noise control laws must be approved by and be consistent with regulations adopted by DEP. The Noise Control Unit is currently developing standards and regulations for noise abatement and control within the State of Connecticut. These should become effective some time in 1977.

An Advisory Committee under the auspices of DEP works with the program through reviewing options available to the state for noise strategies. The Committee also assists in the development of rules and regulations pertaining to noise control. It is composed of an engineer and an environmental analyst at the present time.

Program administrators stated that the present composition of the Noise Compliance Unit is adequate to meet projected needs for the next few years. On the local level, once regulations are in effect, it is anticipated that between 20 and 25 municipalities will implement some type of formal program, with the largest program consisting of one full-time employee. It is also expected that design and acoustical engineers will be needed by the state's private sector to ensure compliance.

III. PESTICIDES

The pesticide program of Connecticut's Department of Environmental Protection (DEP) is responsible for the implementation of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) as amended. The Pesticide Compliance Unit of DEP's Environmental Quality Division has four people employed for the pesticide program. They include an assistant director, an environmental analyst, an inspector, and a clerk.

There exists no significant projected pesticide workforce increases in Connecticut at the state level since a state commercial applicator training program was already operating prior to FIFRA requirements. In fact, five year estimates for the program show that it expects to pick up only one additional inspector, making a total state pesticide workforce in 1981 of five.

New career openings in the private sector are unknown and will not be readily determinable until the present workforce is certified, thus defining the scope of the labor force. Attrition rates and new entries can then be determined on an yearly basis to provide some idea of the growth in this sector.

IV. POTABLE WATER

The Safe Drinking Water Act (SDWA) enacted in 1974 will be implemented through the Water Supplies Section of the Connecticut State Health Department. The Water Supplies Section is staffed with engineers, chemists, a laboratory technician, and a sanitarian. There are presently 30 certified water treatment plant operators in Connecticut. Only chief operators are required to be certified.

Connecticut is expected to assume primacy for implementing the provisions of the Safe Drinking Water Act within the next five years. Its success in doing so depends, in part, upon the extent of EPA's commitment to provide substantial support to the state's water supply program.

Pursuant to the acceptance of SDWA primacy, it is anticipated that over the next five years workload increases will occur as smaller towns in the state become unable to meet interim regulations due to the lack of resources needed to finance necessary corrective alterations to existing facilities and systems. And, as a consequence of increasing regulatory demands, the number of certified treatment plant operators is expected to double over the next five years.

V. RADIATION

The radiation control program for Connecticut is located within the Environmental Quality Division of the Department of Environmental Protection. On June 1, 1976, the transportation of radioactive materials in large quantities became regulated by the state through a permit system operated by the Connecticut Department of Transportation. The Radiation Compliance Unit is responsible for spot checks en route.

The Radiation Control Unit is staffed with six persons which include two radiation control physicists, two technicians, one typist, and a director. The State Department of Health performs routine laboratory work for the unit. In Connecticut, altogether, it has been estimated that there are about 40 individuals (technical and professional, public and private) engaged in environmental radiation monitoring.

Over the next five year period, the Radiation Compliance Unit expects to grow by the addition of at least three radiation control physicists. If public awareness continues at the present level, the entire state (public and private) environmental monitoring workforce could double by 1982. In the private sector, increased environmental radiation monitoring activities by colleges and universities within the state are likely to result in an increase in radiation control research careers.

VI. SOLID WASTE

The Office of Solid Waste Management, within the Department of Environmental Protection (DEP), regulates the disposal of all solid waste generated in Connecticut. State legislation also created the Connecticut Resource Recovery facility construction plan.

The Office is currently staffed with 19 individuals, in addition to a director, and represents the largest solid waste workforce in Region I. Engineers make up the bulk of the Office's workforce, although there are also geologists, biologists, and field inspectors on its staff.

The Connecticut Resource Recovery Authority is operating with 15 personnel who have backgrounds in planning, financing and engineering. Currently, there are two engineers on the staff who are responsible for maintaining liaisons with the contractors and/or communities establishing resource recovery facilities.

The impact of the new Resource Conservation and Recovery Act of 1976, PL 94-580, at the state level will probably be concentrated in the area of hazardous waste management. Officials of the Office of Solid Waste Management speculate that five or more professional positions will be added to the current staffing level within the next two years, with a subsequent leveling off thereafter. More than likely these individuals will be involved in developing Connecticut's hazardous waste management program.

VII. WASTEWATER

The Water Compliance Unit of Connecticut's Department of Environmental Protection (DEP) is responsible for the control of all industrial and municipal water pollution, as well as oil and chemical handling. The Federal Water Pollution Control Act (FWPCA) is administered by EPA and Connecticut through two programs provided by the act, a construction grant program and a discharge permit program.

The Water Compliance Unit is staffed with sanitary engineers, chemists, sanitarians, field inspectors, and environmental protection specialists. Within Connecticut there are presently 615 certified wastewater treatment facility operators as well as 300 uncertified operators.

If the fiscal austerity measures of the state do continue and additional monies are not forthcoming from EPA, it appears that little, if any, staff growth will occur over the next five years. Field research suggests, however, that the number of certified municipal wastewater treatment system operators will increase by about 100 per year over the next five years.

It appears that little career potential exists in the state agency wastewater program. There will be some job opportunities in the state program for recent engineering graduates, but the high rate of turnover for entry-level engineers suggests that this job is not a long-term career choice for many young engineers. Any potential significant growth in the near future appears to be for treatment plant operators.

VIII. ENERGY

New England electric utilities are heavily dependent upon petroleum and nuclear energy for electrical power generation. Approximately 60 percent of the regional electrical power is petroleum generated and 24 percent is supplied by nuclear fueled power plants. Connecticut produces about one half of the nuclear electrical power generating capacity for the region (2,055 megawatts of 4,204 generated).

Energy conservation must receive priority emphasis in Connecticut for the short- and mid-term energy planning efforts. Toward this goal, the Department of Planning and Energy Policy was established in 1975 to replace and expand the responsibilities of the Connecticut Energy Agency and to consolidate those responsibilities with those of the former planning section of the Planning and Budgeting Division of the Department of Finance and Control.

The Department is responsible for energy policy research and development of a statistical support base for population and energy forecasting. The Department employed 43 persons in 1976,and is expected to reduce staffing to 37 in 1977.

STATE OF CONNECTICUT - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	116	--	--	--	--	--	N/A
NOISE[2]	2	--	--	--	--	--	N/A
PESTICIDES[3]	2045	(5004)	--	--	--	(5005)	N/A
POTABLE WATER[4]	46	--	--	--	--	76	N/A
RADIATION[5]	40	--	--	--	--	45	N/A
SOLID WASTE[6]	10	--	(15)	--	--	--	N/A
WASTEWATER	991	--	--	--	--	--	N/A
ENERGY[7]	43	37	--	--	--	--	N/A
TOTALS	3293	--	--	--	--	--	N/A

[1] The above includes 104 state agency personnel and 12 individuals at the local level. The private sector effort was not discernible.

[2] The above includes only state agency personnel.

[3] The above includes 4 DEP personnel and 2041 certified pesticide applicators. Workforce figures for the Connecticut Extension Service and the Tree Protection Examining Board are not included.

[4] The above includes 16 agency personnel and 30 certified treatment plant operators.

[5] The above includes an estimated 40 individuals (technical and professional, private and public) engaged in environmental monitoring.

[6] The above includes only state agency personnel.

[7] The above includes only state agency personnel.

EDUCATION

The Hartford Graduate Center at Hartford has an Engineering Science Program with an emphasis in Environmental Science and Technology leading to an M.S. degree. A total of thirty semester hours are required to complete this program which began in 1973. The courses are taught by two adjunct professors and seven lecturers in Environmental Science. Current (1976) enrollment is 25 and five persons graduated from the program in that year. Five persons were placed in jobs from the program and additional graduate work in this field is not available at the Hartford Graduate Center.

The Northwestern Connecticut Community College at Winsted has an Environmental Technology Program leading to an associate of science degree. A total of 60 semester hours are required in order to complete this program of study. The courses are taught by one professor who has a Ph.D. Current (1976) enrollment is 25-30 and seven students graduated in 1976. There are two options available: the General and Community Environmental Health Option and the Water Hygiene Option.

LEGISLATION

The environmental/energy legislation for Connecticut was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Policy Act
Environmental Protection Act
Air Pollution Control Law
Noise Pollution Control Act
Vehicular Noise Control Act
Solid Waste Management Act
Solid Waste Management Services Act
Clean Water Act
Inland Wetlands and Water Courses Act

National Environmental Energy Workforce Assessment

Phase I

DELAWARE

State Summary

I. AIR

Air pollution control and abatement activities in Delaware are the responsibility of the Air Resources Section within the Department of Natural Resources and Environmental Control. Delaware's air pollution control program has a current staffing level of 24 persons, whose activities include the development and monitoring of state air pollution control regulations. Most of the Section's engineers are chemical engineers. Over half of the Air Resources Section is staffed with technicians.

Program officials have indicated that a staffing increase of about eight percent per year can be expected over the next five years. Greatest demand will continue to exist for technicians, but the number of actual new jobs will be small because of the current size of the program. Officials believe that Delaware will promulgate regulations for auto emissions, and the program may lead to a maintenance/inspection program.

II. NOISE

Delaware's environmental noise control program is under the jurisdiction of the Division of Environmental Control of the Department of Natural Resources and Environmental Control. The Department shares some authority for noise control with the Department of Public Safety, which has responsibility for vehicular noise.

Although there is no current staff, an initial workforce is anticipated to be six persons, who are occupationally categorized as engineers, technicians, and clerks. In addition, the division expects to utilize the services of a staff attorney, who would work approximately half time in noise control enforcement. The division desires to employ engineers with backgrounds in mechanical, environmental, or industrial engineering, with some training in acoustics being desirable. The technicians will be classified as Environmental Protection Officers, and the technicians plus the attorney make up the enforcement area, which consists of response to citizens' complaints.

Officials in the Division of Environmental Control project a modest increase in staffing levels over the next five years. Three persons may be recruited for noise control activities by 1981. Two persons are needed for additional enforcement activities and the third would be an engineer, preferably with a background in mechanical, industrial, or environmental engineering. With an anticipated increase in enforcement activities, career potential will be greatest for technicians working in enforcement.

III. PESTICIDES

Responsibility for pesticide usage and control in Delaware is with the State Department of Agriculture. The pesticide program is in the Division of Production and Promotion. The current staffing of the pesticide program consists of two persons, both clerical, whose responsibilities consist of the registration and licensing of pesticides and pesticide products.

As of January 1, 1977, program officials indicated that 96 commercial applicators had been trained, and 1,108 private applicators had received training, although none had been certified. There are approximately 3,500 farmers in Delaware, and it is anticipated that about 1,300 will need to be certified. An additional 400 commercial applicators will also require certification.

Program officials indicate that three additional persons will be needed for the program by the time registration and certification programs are completed (estimated to be in late 1977). The three will be full-time pesticide field inspectors to fulfill FIFRA requirements. It is possible that technicians with two-year degrees may be utilized for these positions.

The pesticide program in Delaware has only recently been revised to conform with the federal requirements under FIFRA. Training and certification programs are just getting underway, and it is estimated that, when certification procedures are completed, only small increases in certified applicators will occur.

IV. POTABLE WATER

Responsibility for the conduct of Delaware's potable water program is shared by the Bureau of Environmental Health of the State Health Department and the Division of Environmental Control of the Department of Natural Resources and Environmental Control. The program's activities are concerned with the implementation and enforcement of the federal Safe Drinking Water Act (SDWA). The state has assumed primacy under the act for its implementation and enforcement.

The current staffing level of the potable water program consists of a total of sixteen people. Seven of the people are located in the Health Department, three of which are classified as sanitarians, a professional position which requires a bachelor's degree. Those currently employed in this position have bachelor's degrees in biology and agricultural science. The two positions classified as technicians are water supply aides, positions which do not require a high school education. The remaining nine persons are located in the Department of Natural Resources and Environmental Control, and professionals represented include geologists and hydrologists.

Within both the Health Department and the Department of Natural Resources and Environmental Control, the programs are expected to double in size. Most of the opportunity will be for professionally trained persons, particularly engineers, sanitarians, and scientists such as geologists. There will also be some limited potential for non-professional persons trained as technicians.

V. RADIATION

The Delaware Department of Health and the Social Services Division of Public Health has administrative responsibility for the state's radiation program through the Office of Radiation Safety. At present, the radiation program is involved in limited environmental monitoring (inspection) activities.

At the state level, there are only two persons currently working in the radiation program. One is a physicist, and one is an X-ray technician. Both are involved in X-ray inspection activities. Professionals currently employed in the program anticipate an increase of seven or eight people at the state level by 1982. At least two more degreed radiological health professionals are needed by 1978. Also, one person is expected to be acquired from the federal government on a loan basis in the next five years.

Activities in the area of nuclear power and radioactive waste disposal are expected to pick up once construction plans for two nuclear power stations in the state advance beyond the review stage. Once in operation, the power plants currently under review can be expected to provide a substantial number of jobs for nuclear engineers, scientists, and technicians. The development of nuclear power in the state will also affect the number of jobs available in radioactive waste disposal.

VI. SOLID WASTE

In 1975, the Delaware legislature created the Delaware Solid Waste Authority to provide the state with comprehensive solid waste management services. The Authority is specifically charged with the development and implementation of a statewide solid waste management plan and the establishment of a program for the maximum recovery and reuse of materials and energy resources derived from solid waste. This legislation also transferred the licensing powers of the Department of Natural Resources and Environmental Control for hauling, conveying, and transporting solid wastes to the Authority, although the Department retains regulatory control over the program.

Delaware's solid waste program currently has a staffing level of nine persons. They are divided between the Solid Waste Authority and the Department's Division of Environmental Control. The Division employs a sanitary engineer, a chemical engineer, and a secretary to manage the program. The Authority is staffed with six persons and two, including the Director, are engineers with training in sanitary and chemical engineering. One is a planner,and the remaining three positions are clerical.

Officials in the Solid Waste Authority expect an increase to 14 persons over the next five years. With the beginning of operation of the state's resource recovery facility in 1981, opportunities will exist for operating personnel. There should also be opportunities developing in the private sector, since much of the state's activities in this area will be contracted.

VII. WASTE WATER

The waste water program in Delaware is under the jurisdiction of the Division of Environmental Control of the Department of Natural Resources and Environmental Control. The U.S. EPA has delegated authority to the Department for issuing the National Pollutant Discharge Elimination System (NPDES) permits.

The waste water program consists of 36 people in the Division of Environmental Control. Positions include engineers, planners, lab technicians, technicians, and clerks. The engineers are chemical and sanitary engineers with professional training in those disciplines. The two planners are professionals with backgrounds in the physical or natural sciences. Those persons holding technician positions are not required to have college degrees, although some college training is considered desirable.

Within the state program, only nine additional positions are anticipated over the next five years. Although most of these will require professionally trained persons with backgrounds in engineering or the natural sciences, significant technician opportunities are expected to exist for those who do not have college degrees.

Delaware has no operator certification or comprehensive training program at the present time. It is estimated that both of these activities will be initiated within the next year or two in an effort to upgrade the operations of waste water treatment plants.

VIII. ENERGY

Energy Office functions in Delaware are jointly administered by the Division of Emergency Planning and Operations under the Department of Public Safety and the newly created Governor's Energy Commission. The Division of Emergency Planning and Operations has now become primarily responsible for fuels allocations,whereas the Commission now has responsibility for energy conservation planning.

Since the change over of administrations in Delaware's state government, the new Governor has appointed a Governor's Energy Advisor to serve as Executive Director of his Governor's Energy Commission which prepares energy conservation plans. The commission is also made up of Governor-appointed members from the private sector in the state.

The director of the Division now has responsibilities only for fuels allocations and management of the state set-aside supplies. This person is the only person in the Division with this responsibility. The Governor's Energy Advisor along with a secretary are the only two full-time state employees with energy conservation planning responsibilities. The state thus has three persons total with energy-related planning jobs on the state level in Delaware.

Assuming that the state's energy conservation plan is accepted by the U.S. Federal Energy Administration (FEA) and funds are made available to hire additional personnel to implement the proposal, four full-time planners, with managerial expertise, may be hired by the Commission to implement the plan.

STATE OF DELAWARE - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	24	25	28	29	32	33	7%
NOISE[2]	6	7	9	9	10	10	11%
PESTICIDES[3]	2	5	5	5	5	5	30%
POTABLE WATER[4]	16	19	23	27	31	36	18%
RADIATION[5]	2	2	6	6	7	8	46%
SOLID WASTE[6]	9	9	13	15	21	21	20%
WASTEWATER[7]	36	36	39	39	45	45	5%
ENERGY[8]	3	7	7	7	7	7	27%
TOTALS	92	110	130	137	158	165	12%

[1] The above represents only state agency personnel.

[2] The above does not include law enforcement agencies or the private sector for which figures were not available.

[3] The above includes state program personnel, but does not include an estimated 400 commercial and 1300 private applicators who will require certification.

[4] The above does not include water supply and water treatment plant operators for which figures were not available.

[5] The above includes only state agency personnel.

[6] The above does not include private sector personnel for which figures were not available.

[7] The above does not include an estimated 250 wastewater treatment plant operators for which projections were not available.

[8] The above includes only state energy planning personnel.

EDUCATION

Two post-secondary educational institutions in the State of Delaware offer career options in environmental studies: University of Delaware and Delaware Technical and Community College at Stanton. A Master of Education degree in Population and Environmental Education is available through the University of Delaware. In addition to this degree program, the University is a principal sponsor of the Coastal/Oceanic Awareness Study Program. The program is a multidiciplinary learning program designed to increase elementary and secondary students' knowledge of marine and coastal environments.

An Associate of Science degree in Environmental Engineering Technology is available through the Delaware Technical and Community College at Stanton. Curricula materials emphasize numerous environmental disciplines including solid waste, air and water pollution, and environmental health.

Most post-secondary educational institutions in Delaware offer select courses in environmental disciplines through their existing department structures. Such courses include Man and Environment, Ecology, Plant Science, Meteorology, and Civil Engineering. Nevertheless, other than the two previously mentioned programs available through the University of Delaware and the Delaware Technical and Community College at Stanton environmental degree career options are scarce.

LEGISLATION

The environmental/energy legislation for Delaware was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Protection Act
Noise Control Act
Pesticide Law
Solid Waste Authority Act
Coastal Zone Act
Beach Preservation Act of 1972
Underwater Lands Act
Wetlands Act

National Environmental Energy Workforce Assessment

Phase I

FLORIDA

State Summary

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I. AIR

The Florida Department of Environmental Regulation (DER) is responsible for the state's air pollution control program. Sources indicate that at least one-half of Florida's air pollution problems are caused by transportation. At the present time, approximately 66 person-years in the Department are expended toward the air program, chiefly engineers, scientists and technicians. DER sources estimate that by 1982, the number of persons in the air porgram will be approximately 150% of its current level, for a total of 99 positions.

There are currently 14 local air programs in the state, six of which are partially supported by federal funds. Approximately 111 person-years are currently involved in these programs. An approximate 10% annual workforce growth rate is expected by officials in the field.

It appears that there are 1,000 to 1,300 persons working in air pollution control in Florida, most (est. 85%) in the private sector, servicing the field on a part-time basis. Private sector growth is expected to be minimal, although greater use may be made of technicians as they are available.

State and local officials have of necessity reduced the formal technical training to air pollution personnel, chiefly because of budget restraints. Officials indicate that this situation could severely handicap the programs. Participation in the Southeastern Air Pollution Training Committee that was formed by the Region IV Environmental Protection should assist the public agencies in meeting training needs.

II. NOISE

The Department of Environmental Regulation is the state agency responsible for environmental noise control in Florida. State laws currently allow for regulation of environmental noise stemming from motor vehicles, the state's largest single cause of noise pollution. In addition to implementing the motor vehicle program, DER has cooperated with five universities in providing technical assistance to cities and counties. The program is currently staffed with two persons, and about 20 persons from the universities are involved with the program. Five-year projections provide for a total of four to five full-time persons for noise in DER, and one or two persons in each DER district office to assist part-time with the program. Sources indicate that the number involved in universities with the program will double within five years.

Seven local agencies are involved in noise control, for a total of approximately 100 person-years, representing as many as 25 people. This number is expected to double by 1982. In addition, 260 law enforcement officers have been trained in the field and carry out enforcement duties. This number may increase by 30 within five years.

Sources are aware of three university professors that offer consulting services in the field, as well as one other private firm. Few industries currently address environmental noise. The industrial workforce for environmental noise will grow to some degree, and the number of consultants will increase within five years.

III. PESTICIDES

The enforcement of the Florida Pesticide Law is charged to the Florida Department of Agriculture and Consumer Services. To carry out the required pesticide program, the Department entered into agreement with the following state agencies: The Department of Health and Rehabilitative Services, the Department of Natural Resources, the Department of Environmental Regulation and the Institute of Food and Agricultural Sciences (IFAS). Each agency has specified functions for carrying out the State Certification Plan. Within these agencies are approximately 254 persons that service the pesticides field on a full-or part-time basis, and most are degreed, with agricultural backgrounds. This number includes 125 county extension leaders that train private applicators. Only the lead agency expects to increase its staffing level in the next five years.

State sources estimate that 16,500 private applicators will require certification by October 21, 1977, as will approximately 5,000 commercial applicators. State officials found it difficult to speculate concerning career potentials in the area of application. However, it appears that the greatest employment opportunities will exist in the area of aquatic weed control, particularly because of problems with the _hydrilla_ plant. Such a demand for trained personnel is expected that officials forecast a need for related institutional training programs.

Most of the training for applicator certification is carried out by IFAS and county extension leaders.

IV. POTABLE WATER

The Department of Environmental Regulation is responsible for Florida's potable water program. The state plans to assume primacy for the Federal Safe Drinking Water Act during 1977, although new legislation will be required to have full legal authority.

The Department currently utilizes approximately 25 person-years of effort for its potable water program. Nine county health departments also provide the services of sanitary engineers, and seventeen chemists provide laboratory analyses of drinking water samples. The number of DER personnel for this program will increase during 1977 to approximately 23. Further increases will be contingent on future engineering and staffing commitments by the Department of Health and Rehabilitative Services through its county health departments and laboratories. Officials project that major staffing needs will be met within one to two years.

All operators of water treatment plants must be certified. There are 1,934 certificates issued to operators. A growth in the number of operators is projected at approximately 8% per year. The DER administers the certification program, and approves courses and programs for operators. Sources predict that available opportunities will be adequate for meeting needs within several years.

At the state level, demands should increase for engineers, chemists, biologists and laboratory technicians. The chief demand for operators should be for those at the entry level.

V. RADIATION

Radiation control functions in Florida are the responsibility of the Department of Health and Rehabilitative Services, carried out through its Radiological Health Program and Office of Laboratory Services. A chief radiological problem in the state stems from phosphate mining in central Florida. In addition three nuclear power units are operable in the state, and several more are under construction.

The principal problems of the overall program are that it is both understaffed and underfunded to carry out all needed functions. There are currently 29 persons working at the state level: 19 health physicists, 3 chemists, one laboratory technican and 6 clerical employees. If all of the required positions, as is projected, are received by 1981, the overall program will have a total staff of 55, the majority being health physicists.

There are an estimated 35 health physicists employed by Florida's nuclear power plants, hospitals and industry. Approximately 50 nuclear and medical X-ray technicians devote a portion of their time to environmental radiation surveillance activities. These numbers are expected to grow because of the expanding nuclear industry and increased usage of radioisotopes and X-ray machines.

In sum, it appears that career opportunities for radiation control personnel, such as health physicists, radiation physicists and radiation control technicians will increase during the next five years. State sources also foresee a need developing for research scientists in the radiation field.

VI. SOLID WASTE

Solid waste control functions are principally carried out in the state by the Florida Department of Environmental Regulation (DER). The Resource Recovery Council promotes resource recovery in the state and recommends legislation. The DER will implement a solid waste program under the mandates of the Federal Resource Conservation and Recovery Act of 1976. Approximately 25 person-years in DER are expended toward solid waste, consisting chiefly of engineers and scientists. Additional positions have been requested, but may not be allocated because of budget limitations. Specific projections are not readily available for reasons that include the recency of the federal Act's passage.

Thirteen local agencies carry out planning and implementation of solid waste control activities. Approximately 16 person-years of effort are expended in this area. This effort may double within several years, but subsequent growth rates cannot be accurately predicted at this time.

State sources have estimated that there are currently 800 to 1,000 landfill operators in the state. This number is expected to increase, possibly to 1,500. If resource recovery programs become implemented, this growth rate may be higher, causing a need for operators with higher skills, for trained technicians and for highly skilled engineers. For hazardous waste programs, requirements are expected to occur for technicians, scientists and engineers. Specific growth rates will become increasingly apparent in the future.

VII. WASTEWATER

Implementation of Florida's wastewater program is assigned to the Department of Environmental Regulation (DER). In the Department, approximately 233 person-years are devoted to the water quality program. Because of state budget limitations, officials predict that this number will remain relatively stable over the next five years. Florida has accepted NPDES permitting authority.

Fifteen local agencies have wastewater programs. There are currently approximately 224 person-years in these agencies expended toward these programs, and sources in the field suggest that this number may grow by approximately 10% annually.

Florida laws require that operators of wastewater treatment plants be certified, and there are currently 2,706 certificates issued to operators, not including Grade D, the lowest grade, for which figures are unavailable. An average annual growth rate for the next five years is projected at approximately 8%.

The DER certifies plant operators and will attempt to gain authority to require certification of operators of wastewater collection systems. The DER also sets guidelines and approves curricula in the state for training operators. Officials project that within several years available training opportunities will be adequate for meeting needs.

Increased opportunities should occur for engineers, scientists and technicians in local pollution control programs. Opportunities should also increase for entry level wastewater treatment plant operators.

VIII. ENERGY

The State of Florida has two main energy agencies, with the State Energy Office assuming the primary role. This Office is responsible for the planning, development, coordination and implementation of the state energy program which includes energy conservation, contingency planning, allocation, data collection, analysis, public information and education. The Governor's Petroleum Allocation and Energy Conservation Council has the responsibility of assisting in the implementation of the mandatory allocation program and minimizing the adverse effects of fuel shortages. Several other state agencies are involved in the field of energy in some manner.

The State Energy Office is currently staffed with 18 persons. The Office has received planning grants from the Federal Energy Policy and Conservation Act to carry out an energy conservation program. An increased workforce will occur and sources project that the Office will be staffed with 40 persons by 1982, chiefly with energy analysts, energy specialists and planners.

Energy officials are confident that the career potential in the field of energy will markedly improve over the next five years. A growth potential in the field of solar energy is forecast.

STATE OF FLORIDA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR [1]	177	194	223	244	267	290	10%
NOISE [2]	307	340	353	365	378	391	5%
PESTICIDES [3]	254	256	262	262	262	262	1%
POTABLE WATER [4]	1,968	2,146	2,317	2,501	2,702	2,920	8%
RADIATION [5]	29	32	38	44	50	55	14%
SOLID WASTE [6]	941	1,064	1,187	1,311	1,434	1,557	11%
WASTEWATER [7]	3,163	3,140	3,378	3,636	3,916	4,220	6%
ENERGY [8]	18	22	30	32	35	40	18%
TOTALS	6,857	7,194	7,778	8,395	9,044	9,735	7%

[1] Includes the state and local agencies. An estimated 800 to 1,100 currently service the field in the private sector, and little workforce growth is expected.

[2] Includes the state agency, local programs, state universities and law enforcement officials.

[3] Includes public agencies. Not included are an estimated 5,000 commercial and 16,500 private applicators.

[4] Includes the lead agency, county sanitary engineers and certified water treatment plant operators. Not included is laboratory capability of the Department of Health and Rehabilitative Services (HRS).

[5] Includes the state agency. An estimated 85 persons in the private sector are engaged in radiation control on a full- or part-time basis.

[6] The 1976 figure includes the state agency, local programs and the estimated number of landfill operators. Projections do not include the state agency.

[7] The above includes the state agency, local agencies and certified wastewater treatment plant operators.

[8] Includes only the state agency personnel.

EDUCATION

There are many educational institutions in Florida that include environmental programs in their curricula. The University of Florida offers B.S., M.S., and Ph.D. degrees in Environmental Engineering Sciences, Civil Engineering, and Nuclear Engineering, as well as housing a Center for Training, Research and Education for Environmental Occupations. Florida A&M University offers A.S. and B.S. degrees in Entomology and Structural Pest Control. Florida Technological University awards bachelor degrees in Civil Engineering and Environmental Sciences. Florida International and Heed Universities both provide environmental curricula with a variety of concentrations.

Rollins College utilizes a multidisciplinary approach to its Environmental Studies. Miami-Dade Community College provides both Environmental Control Technology and Civil Engineering programs on an associate degree level. There are several remaining colleges that offer environmental curricula in such areas as Pest Control Technology, Environmental Control Engineering, Water and Wastewater Technology, Environmental Studies and Science. They are: Broward, Brevard, and Sante Fe Community Colleges and Manatee and St. John's River Junior Colleges.

A number of two year schools offer courses/degrees in water/wastewater technology. State sources predict that 20-25 such programs will be operational and certified by the state agency within several years.

LEGISLATION

The environmental/energy legislation for Florida was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Protection Act

Air and Water Pollution Control Act

Motor Vehicle Noise Prevention and Control Act

Pesticide Application Act of 1974

Pesticide Law

Water Resources Act of 1972

Florida Litter Law

Resource Recovery and Management Act

Sewage Disposal Facilities Law

Environmental Land and Water Management Act of 1972

Pollutant Spill Prevention and Control Act

Beach and Shore Preservation Act

Reclamation of Lands Disturbed by the Severance of Solid Minerals Act

National Environmental Energy Workforce Assessment

Phase I

GEORGIA

State Summary

I. AIR

The Environmental Protection Division (EPD) of the Georgia Department of Natural Resources is responsible for the implementation and enforcement of Georgia's Air Quality Control Act. The Fulton County Health Department operates an air pollution control program that works in cooperation with the EPD. The EPD employs 72 persons for air pollution control, while Fulton County employs 14 persons. The Region IV Environmental Protection Agency in Atlanta employs 61 persons for air pollution control.

Professional and technical personnel are employed in the private sector for air pollution control, both in-plant and in consulting firms. The number of air pollution personnel in the private sector appears to nearly equal the number in the public sector.

EPD officials project that five additional persons will be added to the air pollution control staff within the next five years, while the Fulton County staff is expected to decrease to ten. Field research indicates that less than 50 additional personnel will be required for the field for the private sector during the next five years. Region IV EPA staff is expected to increase by two percent annually.

Training needs have previously, in large part, been met by EPA's Air Pollution Training Institute. High tuition rates have recently caused limitations, especially in the public sector, to the number of persons that can participate. Through the development of a regional training committee, personnel in the public sector are forming strategies for filling current training voids.

II. NOISE

Georgia currently has no statewide noise control legislation. Within the Georgia Department of Human Resources, one person currently is employed for noise control activities who answers statewide noise complaints, conducts surveys, and assists municipalities in the development of noise ordinances. According to a recent survey, 29 cities have some kind of noise ordinance. As repeated attempts to facilitate passage of state noise legislation have failed, the approach has been changed to work toward the adoption of Rules and Regulations into the State Health Code. If adopted, five to six additional personnel would be hired for the noise program, and county sanitarians would be utilized (451 sanitarians have been trained in the field).

The Georgia Department of Transportation employs one full-time person for noise control, and additional persons work part-time in the field. Several additional full-time noise analysts may be hired in the next five years.

Also located in Georgia is the U.S. EPA Region IV Office. During 1976, two persons worked full-time in noise. This staff may increase to four or five by 1982.

Results of a survey conducted by the Department of Human Resources indicate that individuals in the state find vehicular noise to be the most distressing. Industrial noise is not currently a serious problem and few industries employ personnel chiefly for environmental noise control. Sources are aware of three consulting firms that offer services in the noise control field.

III. PESTICIDES

The Pesticides Division of the Georgia Department of Agriculture is responsible for the enforcement and implementation of the Georgia Pesticides Control Act and the Pesticide Use and Application Act. The Division, which employs thirteen persons, registers restricted-use pesticides and certifies pesticide applicators. The Entomology Division of the Department enforces the Georgia Structural Pest Control Act, and employs eleven persons for pesticides. The Department's Laboratory Division performs pesticide related analyses, employing nine persons for these purposes. The Structural Pest Control Commission employs two staff personnel.

Thirty-five extension specialists of the Georgia Cooperative Extension Service carry out activities in the field, chiefly training commercial applicators. Two hundred and twenty-two county agents train private applicators on a part-time basis.

Sources estimate that 7,916 certificates will be issued to commercial applicators by October 21, 1977. An estimated 45,000 private applicators will also require certification.

Increased numbers of personnel are not anticipated to be required at the state level during the next five years, and shifts in priorities or changes in activities are not expected to occur. The number of commercial applicators is also not expected to increase dramatically, although an upgrading may occur regarding applicator expertise.

Also located in Georgia is the Region IV Environmental Protection Agency, which employs 19 persons for pesticides. This number may increase to 31 in the next five years.

IV. POTABLE WATER

The Environmental Protection Division of the Georgia Department of Natural Resources implements the state's Water Supply Control Act and employs 34 persons for potable water. This state anticipates assuming primacy for the Federal Safe Drinking Water Act, which would cause significant workforce increases with an estimated additional 61 persons by 1982.

The State operates a mandatory certification program for operators of water treatment plants. As of June 30, 1976, 1,247 certificates were issued to plant operators. Sources estimate that 1,000 additional certified operators will be required because of the construction, expansion and upgrading of plants, coupled with increased enforcement of the certification laws.

The EPD coordinates training for water treatment plant operators. Three types of training are being carried out: a) the Georgia Water and Wastewater Institute, b) Coupled On-The-Job Training Program and c) Spring and Fall Short Course Schools. Officials estimate that 800 persons receive training each year in these three programs. It is estimated that 1,000 operators will require training each year to meet demands. The agency may be able to accommodate this number of students if federal funding is not ceased.

The U.S. Environmental Protection Agency, Region IV, employs approximately 16 persons in the field of potable water. This number is expected to increase to 40 by 1982 to maintain and expand existing programs and for the development of the Underground Injection Control Program.

V. RADIATION

Radiation control functions in Georgia take place in the Department of Natural Resources and in the Department of Human Resources. The former agency conducts such activities as environmental monitoring and emergency response planning, and employs three persons full-time for radiation. Approximately 30 field personnel are utilized as needed. With regard to environmental radiation, the latter agency controls the discharge of radiation into waterways by hospitals and medical laboratories. EPA Region IV Offices are located in Georgia. Currently within these public agencies a total of twelve persons working full-time in the field of environmental radiation control. This number is expected to double within five years, with chief demands being for health physicists, nuclear engineers and technicians. The Department of Human Resources will also train approximately 10 engineers in local health agencies to perform radiation-related duties.

In the private sector, an estimated fifteen to twenty persons currently service the field, both within Georgia Power Company, and in medical facilities. This may increase by approximately fifteen within five years due to the addition of nuclear generating plants and an increased usage of radioactive drugs.

Within the state as a whole, demands will be greatest for health physicists, followed closely by nuclear engineers and technicians. While upgrade training programs are becoming increasingly available, especially for regulatory personnel, curricula in colleges, universities and vocational schools are not currently supplying the numbers of trained personnel required in the state.

VI. SOLID WASTE

The Georgia Solid Waste Management Act gives responsibility for regulating solid waste management to the Environmental Protection Division (EPD) of the Georgia Department of Natural Resources. Enforcement is carried out through a permit system, and all cities and counties are required to prepare long-range solid waste management plans.

The EPD will also be responsible for implementing the Federal Resource Conservation and Recovery Act of 1976. While 36 personnel are currently involved in solid waste in the EPD, this number is expected to increase to over 60 within five years as a result. The Region IV Environmental Protection Agency in Atlanta also expects to increase its solid waste staffing level from five to thirty for implementing the new Act.

There are an estimated 600-620 persons in the state engaged in solid waste disposal, most of whom are landfill operators. This number is expected to remain constant, although shifts will occur whereby one will see a need for more personnel with expertise in the areas of resource recovery and hazardous waste management. The agency cooperates with educational institutions in offering courses in solid waste management.

Career opportunities should increase in the public and private sectors chiefly for engineers and scientists, as well as for trained equipment operators. The state agency has difficulty hiring persons with training or experience in the field, since few educational opportunities are available. This lack may be felt more acutely in the future as the field becomes increasingly technical.

VII. WASTEWATER

The Environmental Protection Division (EPD) of the Georgia Department of Natural Resources implements the Georgia Water Quality Control Act. A total of 107 persons in the EPD work in water pollution control, chiefly engineers and scientists. Administrators project that this number may increase to 152 by 1982.

The EPD implements a mandatory certification program for operators of wastewater treatment plants. As of June 30, 1976, there were 1,247 active certificates issued to operators of waste treatment facilities. Officials project that 1,000 additional certified operators will be required within the next five years, and the skill level may demonstrate an upward shift.

The Environmental Protection Agency, Region IV, employs approximately 248 persons in wastewater within the state. Personnel increases are expected, with a projected increase of 57 by 1982, not including clerical, trainee and temporary employees.

Training plant operators is coordinated by the EPD. There are three programs available: Georgia Water and Wastewater Institute, Coupled On-The-Job Training Program, and Spring and Fall Short Course School. Approximately 800 operators are trained each year, and an estimated 1,000 will require training annually. The state may be able to accommodate this many students if federal funding continues.

Career potentials appear to be good for civil and sanitary engineers at the regulatory level, as well as for scientists and technicians. Certified wastewater treatment plant operators of all levels should alsc be in demand.

VIII. ENERGY

Recently, the Office of Energy Resources was created in Georgia which coordinates energy-related activities in the state, and develops plans for energy conservation and efficiency and emergency response. This Office currently has a twelve-member staff. Other agencies/institutions in Georgia that have involvement in the energy field include: The State Economic Opportunity Office, the Office of Planning and Budget, the Institute of Ecology and the Office of Energy Research at the University of Georgia, the Engineering Experiment Station of Georgia Institute of Technology, the Atlanta Regional Commission and the Southwest Georgia Area Planning and Development Commission. Also located in Georgia are various federal agencies that have energy concerns which include the Federal Energy Administration, the Nuclear Regulatory Commission and the Energy Research and Develop Administration. Based upon interviews with officials located in the above-mentioned agencies, it is estimated that approximately 500 persons in Georgia are involved to some degree in energy conversion/conservation activities.

Future workforce levels in the public secotr are in large part dependent upon federal policies and funding levels. It appears probable that the overall workforce will not decrease, although specific projections are unavailable. In the private sector, state sources project increasing numbers of architects, engineers and real estate people that will seek to develop demonstration projects through the Department of Housing and Urban Development.

STATE OF GEORGIA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR [1]	287	295	311	322	333	343	4%
NOISE [2]	4					15	n/a
PESTICIDES [3]	318	324	330	336	342	349	2%
POTABLE WATER [4]	1,297	1,539	1,752	1,965	2,176	2,382	13%
RADIATION [5]	60	68	76	84	92	100	11%
SOLID WASTE [6]	651	664	684	696	701	704	2%
WASTEWATER [7]	1,540	1,763	1,986	2,209	2,434	2,642	11%
ENERGY [8]	500	500	500	500	500	500	0
TOTALS	4,657	5,153	5,639	6,112	6,578	7,035	9%

[1] Includes personnel in the public and private sectors, but does not include possible implications of an auto emissions program currently being developed.

[2] Includes full-time personnel in the public sector. Not included are 451 sanitarians who have been trained in noise control, part-time personnel in the Department of Transportation, or personnel in the private sector, for which figures are unavailable.

[3] Includes federal, state and county personnel and does not include an estimated 7,916 commerical and 45,000 private applicators to be certified by October 21, 1977

[4] Includes EPA and state personnel and certified water treatment plant operators.

[5] Includes full- and part-time personnel in EPA, state and local agencies, the power industry and medical facilities.

[6] Includes the state agency, RPA and an estimated 610 persons in disposal, for which no growth is expected.

[7] Includes EPA, the state agency certified wastewater treatment plant operators.

[8] The 1976 figure is an estimate which includes federal, state and local agencies/ institutions with energy-related concerns. No specific projections are available, but appears that the total number will not decline, but may increase.

EDUCATION

In Georgia there are several educational institutions that provide environmental curricula which prepare students for employment in a number of environmental fields.

The Georgia Institute of Technology offers a variety of programs including: 1) Acoustical, 2) Energy, 3) Chemical, 4) Civil, 5) Mechanical, and 6) Nuclear Engineering on the B.S., M.S. and Ph.D. levels. Southern Technical Institute offers A.S. and B.S. degrees in Civil Engineering as well as an A.S. degree in Electrical Engineering with a Nuclear Safety Option.

West Georgia College offers a non-degreed Community Education program with an emphasis on environmental technology that familiarizes students in Wastewater, Surface and Ground Water Treatment, and further water study through on-the-job training.

Georgia Military College in Milledgeville offers an A.S. degree in Engineering with an optional concentration in Environmental Health.

The College of Agriculture at the University of Georgia offers an environmental health science curriculum as well as a concentration in pest management. Georgia College awards A.S., B.S., and M.S. degrees in Environmental Science in which students may specialize in water quality, air quality or a mixture of both areas. Middle Georgia College offers an A.S. degree curriculum in Environmental Technology.

LEGISLATION

The environmental/energy legislation for Georgia was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Air Quality Control Act

Vehicular Visible Emission Control Act

Pesticide Use and Application Act

Economic Poisons Act

Water Supply Quality Control Act

Groundwater Use Act

Radiation Control Act

Solid Waste Management Act

Certification of Water and Waste Water Treatment Plant Operators Act

Water Quality Control Act

Surface Mining Act

Council for Energy Resources Act

National Environmental Energy Workforce Assessment

Phase I

HAWAII

State Summary

I. AIR

Hawaii air pollution control programs are administered by the Department of Health, Environmental Protection and Health Services Division. The major activities of the air pollution control program include long-range planning, developing rules and regulations, monitoring the air environment, investigating and answering complaints, and enforcing regulations. Eight professional staff members work in the air pollution control program. Four are degreed engineers, and four staff members hold the position of Environmental Health Specialist. The Division indicated that due to fiscal constraints it would not experience any growth in program staff over the next five years.

The Department of Health, Medical Health Services Division, Laboratories Branch, provides three chemists and one federally assigned instrumentation technician to the air pollution control program. Since neither the staffing nor the functions of the Division is expected to increase, it is unlikely that laboratory staffing will increase either.

Sources indicate that there are an estimated 60 persons working in air pollution control in the private sector, approximately 20 of which are consulting engineers and scientists. The majority of the non-consulting workforce is employed by the sugar, cement, oil refining, and electric power industries. As with the public sector, no growth is expected in the private sector workforce over the next five years.

II. NOISE

Regulatory authority for the control of noise pollution is vested in the Department of Health, Division of Environmental Protection and Health Services, Noise and Radiation Branch, Noise Control Section. The professional staff of the Noise Control Section consists of nine Environmental Health Specialists and the Chief of the Noise and Radiation Control Branch. The section may experience a staffing increase of from five to nine more persons in the next five years. Additional positions will be filled by degreed scientists and by persons with background in law enforcement.

Estimates for workforce composition of the private sector include four acoustical engineers and up to 50 professional engineers, architects, and draftpersons who are involved in control of noise through equipment design. Little growth is expected in the private sector during the next five years. However, if stringent federal legislation is promulgated, workforce growth in noise control is likely to increase.

Training needs which have been identified for the State of Hawaii include acoustical theory, new equipment development, enforcement problems and solutions, planning, and developing effective regulations.

III. PESTICIDES

The Department of Agriculture, Plant Industry Division, Pesticide-Weed Control Branch is responsible for the administration, regulation, and enforcement of the pesticide program. The branch has a professional staff of eleven. Seven members of the staff are engaged in pesticide activities.

The University of Hawaii Cooperative Extension Service is responsible for the development of training programs for commercial and private applicators. The program is operated through the efforts of one pesticide coordinator and four supportive staff members. In addition, the 22 extension agents located on all the islands are responsible for providing the actual training and education support to private and commercial applicators who attend the CES tranining programs.

In addition to these two programs, the Department of Health, Sector Control Branch has been delegated the authority for the statewide training program for public health pesticide applicators. This program is staffed with one administrator and six entomologists.

Estimates for the private sector pesticide-related workforce include 1,294 commercial applicators and 6,000 farmers. Sources expect little workforce growth in either the public or private sector. The only state agency predicting growth is the Pesticide-Weed Control Branch of the Department of Agriculture which may require two more inspectors. The private sector workforce is sufficient to serve present needs.

IV. POTABLE WATER

The Hawaii Department of Health, Environmental Protection and Health Services Division has regulatory responsibility for the state drinking water program. As such, this Division carries out inspection of public water supply systems, review of construction plans, and investigation of complaints. One civil engineer, one planner, and one attorney devote part of their time to the drinking water program within the Division. In 1977, the Division may add one or two engineers to its water supply program staff to conduct activities for compliance with the Safe Drinking Water Act. In total, approximately 5 person-years will be devoted to water supply in 1977, and this figure is expected to remain the same or decrease slightly over the next five years.

The Honolulu headquarters and district health offices conduct inspections and collect water samples on a part-time basis. Approximately 20 sanitarians are active in this program. More responsibility for drinking water programs may be transfered to the districts during the coming five years, and as this occurs, staff time devoted to the water programs may increase somewhat.

Information on the private sector workforce is limited; however, the approximate nonclerical staffing level of the county water departments is 555 with an estimated 20% in administrative and engineering positions and 80% in laborer positions. Since water treatment is considered to be adequate, sources do not expect an increase in the demand for treatment plant operators over the next five years.

V. RADIATION

Principal responsibility for radiation protection is vested in the Hawaii Department of Health, Environmental Protection and Health Services Division, Noise and Radiation Branch. The radiation program is currently staffed with one environmental health specialist and a part-time administrator. An additional environmental health specialist position is authorized, but vacant. The radiation program expects to fill this vacancy in the coming year and add one more environmental health specialist by 1981 to assist in the licensing of radiological technicians.

Private sector data regarding the number of people employed in radiation control are limited. There are 22 facilities using industrial X-ray devices, and it is projected that each of these facilities probably has a safety officer responsible for the proper use of the equipment. It is further estimated that the 179 hospitals and 28 clinics using medical diagnostic equipment may also have one person in each facility responsible for the equipment. No growth is expected in the private sector for personnel engaged in the control of environmental radiation.

In summary, it is clear that the workforce in radiation protection is very small in Hawaii. Since there is little need for radiation protection in the state, workforce growth over the next five years is expected to be minimal.

VI. SOLID WASTE

Regulatory responsibility for solid waste is vested in the Hawaii Department of Health, Environmental Protection and Health Services Division. Within the Environmental Protection and Health Services Division, the Pollution Technical Review Branch and the Pollution Investigation and Enforcement Branch provide personnel for the solid waste management program. In 1976, approximately two person-years were devoted to the solid waste management section, with each of the branches contributing one person-year. The division expects little, if any, workforce growth over the next five years; however, if the resource recovery effort is expanded, one engineer may be added to the staff in 1979 or 1980.

Partial information is available on the private sector workforce. Data were collected on the disposal programs in Hawaii, Honolulu, and Maui counties. The data reflected a total of 157 persons employed in landfill operations within these counties. Collection system data were collected only in the Counties of Honolulu and Maui. Currently, a total of 462 persons staff collection programs within these counties. The disposal programs will experience a decrease in personnel as the municipal incinerators are closed in Honolulu. However, the average per annum growth for heavy equipment operators is 16%, reflecting primarily an increase in landfills and transfer stations in Honolulu. Minimal growth is expected in the number of persons working in collection systems. A resource recovery system and shredder are planned for the County of Hawaii by 1980 and will employ an added 15 persons.

VII. WASTEWATER

Within the Division of Environmental Protection and Health Service, the two branches primarily concerned with water quality control are the Pollution Technical Review Branch (PTR) and the Pollution Investigation and Enforcement Branch (PIE). Twenty-four professional staff members from the PTR and PIE Branches work in the water quality control program, and an additional five persons have been hired on a temporary basis for "208" planning. The Department of Health, Laboratories Branch, Medical Health Services Division devoted approximately 6 person years in 1976 to the water quality program. The water quality program will probably experience a decline in staffing over the next five years. No growth is expected in the laboratory staffing, and the "208" staffing positions are likely to be eliminated due to lack of sufficient funds.

The Division sources estimate that there are approximately 100 municipal treatment plant operators and 20 private treatment plant operators in Hawaii. Of the 120 estimated operators, 56 are currently certified under the voluntary program of the Hawaii Water Pollution Control Association. Due to planned construction and expansion, Division sources predict that the workforce requirements for the municipal treatment systems will more than double. It is projected that a total staff of 265 persons will be required by 1980, an increase of 135 positions.

VIII. ENERGY

The Hawaii Department of Planning and Economic Development (DPED) is responsible for energy management and development in the State. The Director of DPED acts as the Energy Resources Coordinator and is assisted by two staff officers within the Department, the State Energy Office and the Center for Science Policy and Technology Assessment. The State Energy Office has a professional staff of two, the director and a research analyst. Similarly, the Center for Science Policy and Technology Assessment has a professional staff of two, again, a director and a research analyst. The State Energy Office anticipates adding between eight and ten persons to its present staff in the next five years. This office will be seeking people with backgrounds in engineering, planning, economics, and environment. The Center for Science Policy and Technology Assessments expects no further growth beyond the current professional staff.

The size of the university and private industry workforce engaged in energy development is difficult to ascertain. Sources indicate that a total of 32,000 persons are involved in the science, engineering, and data processing workforce in Hawaii, and that this workforce is employed in over 375 companies or agencies. Research suggests that the workforce in the private sector engaged in energy research and development will grow as long as federal and state funding for this purpose continues to increase.

STATE OF HAWAII - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	72	72	72	72	72	72	0
NOISE[2]	64	64	64	64	64	64	0
PESTICIDES[3]	7,335	7,335	7,335	7,335	7,335	7,335	0
POTABLE WATER[4]	578	580	580	580	580	580	0
RADIATION[5]	2	2	3	3	4	4	n/a
SOLID WASTE[6]	621	621	600	604	627	630	0
WASTEWATER [7]	34	34	30	30	30	30	-2%
ENERGY [8]	4	4	4	4	4	12	40%
TOTALS	8,710	8,712	8,668	8,692	8,716	8,727	0

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[1] The above includes estimates of total persons involved in both public and private sector air pollution control activities.

[2] The above includes estimates for both the private and public sectors.

[3] The above includes estimates for both the private and public sectors.

[4] This estimate includes data on the public sector, and limited statistics on the private sector

[5] The above is an estimate for the state agency only.

[6] This estimate includes public sector projections, and limited private sector estimates. The private sector figures include data from disposal systems in Hawaii, Honolulu, Maui Counties, collection systems in Honolulu and Maui Counties, and the proposed resource recovery system and the shredder in Hawaii.

[7] This estimate includes only state agency workforce projections, In addition to the state agency, there are approximately 120 operators and 30 supportive service personnel employed in municipal systems. The municipal workforce is expected to grow to 265 persons by 1981.

[8] This estimate includes only state agency personnel. The projected 32,000 persons employed in the science, engineering, and data processing fields were not included.

EDUCATION

The state higher education system in Hawaii is composed primarily of the University of Hawaii System. This is the state university and is constituted as a body corporate by the Constitution of the State of Hawaii. Its wide variety of activities include many which are comparable to those of other institutions of higher education throughout the country. Basically, the University is concerned with instruction, research, and service to its community. The University has instituted and developed programs which take advantage of Hawaii's subtropical, mid-Pacific location and its multi-racial composition. Such programs include those in tropical agriculture, marine biology, geophysics, and Pacific and Asian studies.

The University of Hawaii includes both four-year, graduate, and community college level institutions. Two of the environmental programs offered at the Manoa campus are examined in greater detail in the State Report.

Presently, there are no specific environmental programs on the community college level although courses which deal with the environment are available within various departments. Plans are in the developmental stage for a sewage treatment plant operator program, with two specific courses currently available in chemistry and microbiology.

LEGISLATION

The environmental/energy legislation for Hawaii was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Quality Commission Law
Environmental Quality Control Law
State Environmental Policy Act
Hawaii Statute on Environmental Quality
Hawaii Pesticides Law
Pest Control Operators Law

National Environmental Energy Workforce Assessment

Phase I

IDAHO

State Summary

I. AIR

The Idaho Department of Health and Welfare, Bureau of Air Quality, has primary responsibility for the formulation and implementation of state regulations concerning air pollution control. The five major components which outline the Bureau's program are enforcement, surveillance, reporting, new source reviews, and emergency episode procedures.

The Bureau of Air Quality is presently staffed by 18 persons. Due to expansion in regulatory responsibilities and anticipated increased monitoring activities, Idaho expects to add 15 positions to its air program staff over the next five years. This growth will depend on mandates set forth by federal standards and the environmental attitude of Idaho's legislative body.

The industrial community, employing approximately 350 persons in air pollution control activities, has few air pollution problems of any magnitude. Thus, future workforce growth in this area is expected to be limited. The development of ambient lead standards, field burning control strategies, and minor source compliance orders are presently in the formative stage. To date, private sector workforce projections have yet to be established.

The Bureau does offer some short-term training, such as smoke school and smog-reading school, but the bulk of agency staff training is done on-the-job.

Career potential in this field is primarily in degreed and graduate level positions such as a chemical engineer with a minor in public administration.

II. NOISE

The noise abatement and control program within the Department of Health and Welfare is a low priority program. If necessary, the Department can establish and operate a noise abatement program as layed out in current state legislation. But, at the present time, no full-time regulatory program exists. However, the Department does provide part-time assistance to noise pollution control activities.

Occupational noise problems can be enforced by Federal OSHA standards in the private sector and through the State Labor Department in the public sector. Law enforcement personnel and the State Labor Department personnel involved with OSHA standard enforcement represent the only workforce in this area. Specific workforce figures for noise abatement enforcement were not available.

Municipal noise control ordinances have been established in Boise, Idaho Falls, and Pocatello. The ordinances are enforced by local law enforcement authorities in response to complaints. Ordinances including acoustical criteria for vehicles are present in Idaho Falls and Pocatello only.

Consultant services are provided by various engineering and architectural firms as well as university professors. However, sources in the field cannot provide estimates of the number of persons engaged in consulting on noise control problems.

III. PESTICIDES

The Idaho Department of Agriculture, Pesticides Division is responsible for control and abatement of pesticide pollution. The Department also provides for the registration of pesticides and the licensing of pesticide applicators, consultants, and dealers.

At present, the Department of Agriculture has five professional inspectors with degrees in areas of biology, botany, or entomology working in pesticide pollution control. The Division expects to expand the current staff level by an additional five members to work in registration, licensing, and certification. Biology, botany, and pesticides will be the most applicable areas of study for the positions. The Toxic Substance Control Act of 1976 is expected to create additional need in areas of registration. Workforce activity projections have yet to be determined.

Training and certification of the private sector pesticides workforce is accomplished through the State Cooperative Extension Service. Current approximations of workforce licensing or certification include 350 owner/operators, 1,000 applicators, and 5,000 farmers totaling to 6,350 persons. Private workforce projections in these areas may include 16,569 persons assuming that approximately 10,000 farmers will find it beneficial to become licensed by the Department. In addition to this number are approximately 900 licensed pest control consultants. The number of consultants is expected to increase by 300 in the next five years.

IV. POTABLE WATER

The principal agency resonsible for protection of public water supply is the Idaho Department of Health and Welfare, Division of Environment. This Division currently employs a staff of thirteen professionals in the water supply program. To augment these water supply activities are district health department activities, which employ seven people. The professional disciplines of this combined workforce are sanitary and civil engineering, biology, chemistry, and public health. As a result of increased responsibilities mandated by the Safe Drinking Water Act, an estimated twenty more persons will be needed over the next five years at the public sector level to continue to administrate and coordinate the water supply program activities.

An estimated 350 water operators are involved in water supply according to professionals in the field. Of these, only 44 percent have been certified to date as certification is not yet mandatory. Based on the assumption that a mandatory program will be established within a five-year period, an estimated 310 additional water treatment operators will be needed by 1981.

Currently state and local agencies sponsor a voluntary certification program to promote the improvement and certify the ability of personnel employed in water facilities operation. Training courses designed to promote water operator certification are conducted through community colleges, seminars, and correspondence courses.

V. RADIATION

Regulatory responsibility for radiation control is vested in the Department of Health and Welfare, Radiation Control Section.

The Section's staff of four professionals consists of three senior health physicists and one radiation specialist who performs supervisory functions. Projected program activities indicate a need for four additional persons to augment this staff in order to adequately handle the increased workload. These additional professionals will very likely be two senior health physicists, one radiation chemist, and one monitoring technician.

While comprehensive private sector workforce information was not available, estimates were based on ERDA Publication #78 entitled An Analysis of Nuclear Related Technician Manpower in Western States. A workforce of 93 radiation control technicians was stated as working in Idaho as of January 1, 1975 with a projected need for 37 additional technicians by 1977. The report indicated that both radiation control and monitoring technician positions show an increasing amount of excess demand projected for 1975-1977, resulting in a 33% shortage in 1977.

The Nuclear Regulatory Commission offers ERDA training seminars and courses to Department employees. Training is also available through various universities and community colleges within the state. The Department expects to provide educational programs to approximately 400 X-ray users regarding improved techniques for various examination activities in 1978.

VI. SOLID WASTE

The Idaho Department of Health and Welfare (IDHW), Division of Environment and the seven District Health Departments have been delegated the responsibilities in the solid waste management field. Three professionals currently staff the solid waste section, consisting of one engineer and two sanitarians. An increase of three positions is expected over the next five years, involving the addition of one engineer and two sanitarians.

At the municipal level, there are six sanitarians who provide assistance and support to the overall solid waste efforts through their respective districts. Because of future contracting of district health departments to perform field work, an estimated doubling of staff is expected within the next five years.

Private sector activity involving collection and disposal personnel have been estimated to involve 488 persons, with an estimated increase of 262 persons over the next five years due to more stringent enforcement of regulations and the increased volume of solid waste anticipated to be generated.

At the present time, training is conducted primarily on-the-job at disposal sites and collection systems. Future training involves developing awareness programs which will promote resource conservation and recycling efforts within the general public.

Planning and implementation of the Resource Conservation and Recovery Act of 1976 is expected to develop training activity within the private sector, however, specific programs have not yet been developed.

VII. WASTE WATER

The Idaho Department of Health and Welfare, Division of Environment, Bureau of Water Quality is the principal agency responsible for the control and abatement of waste water pollution.

As the regulatory body for waste water pollution control, the Bureau conducts activities involving a professional workforce of 35 persons. These activities include compliance monitoring surveys, water quality assessments, treatment plant efficiency studies, waste water construction grants administration, and rules and regulation development. Fifteen additional professional positions are expected to develop over the next five years.

Private sector workforce activity is estimated to involve 326 waste water treatment plant operators at the present time. Workforce projection information indicates a probable increase in operator workforce levels to 646 by 1981.

More stringent enforcement of existing legislation and technological advances in the field of waste water treatment are going to create many jobs for treatment plant personnel in the next five years. These positions will include plant operators, maintenance personnel, and a basic labor force. It has been suggested by sources in the field that the proper training and certification of operator personnel may increase the efficiency of a treatment plant by 50 percent. This would indicate that operator training in the future will become an important component in the effort to eliminate waste water pollution in Idaho.

VIII. ENERGY

The Idaho State Office of Energy (ISOE) is the principal agency responsible for developing an effective state energy management plan. The current staff consists of nine professionals in positions of research analysts, public relations specialists, and scientists. If funding becomes available through the FEA, projects involving state conservation plan implementation and statewide auditing of industrial power consumption levels are expected to require the addition of five professional staff members. These positions will include two engineers and three field research specialists.

At the present time, no formalized training programs are operational in the ISOE. However, development of a public-oriented education program is being carried on in the Office and is expected to be operational in the near future.

Plans are currently being implemented for future electric power-plants which will provide a great number of jobs during construction and also a number of jobs during actual operation. Geothermal energy, however, seems to be the greatest potential alternative energy form at the present time, with research being conducted at two locations in Idaho. If this becomes an energy fuel reality, highly trained specialists will be needed to develop and maintain pollution control systems specifically designed to control the particular pollutants inherent in geothermal production.

STATE OF IDAHO - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
[1] AIR	18	25	28	30	32	33	12%
NOISE	0	0	0	0	0	0	0%
[2] PESTICIDES	5	6	7	8	9	10	15%
[3] POTABLE WATER	121	211	310	425	515	585	39%
[4] RADIATION	4	5	6	7	7	8	15%
[5] SOLID WASTE	500	563	632	692	722	759	9%
[6] WASTEWATER	361	420	482	558	626	696	14%
ENERGY	9	10	11	12	13	14	9%
TOTALS	1,018	1,240	1,476	1,732	1,924	2,105	16%

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[1] The above does not include 350 private sector positions, for which projections were not available.

[2] The above does not include 6,350 private sector positions, for which projections were not available.

[3] The above does not include water treatment operators in one specific category as projections by year were not available. A growth from 53 to 104 is expected in the next five years.

[4] The above does not include 93 private sector positions, for which projections were not available.

[5] The above does include both public and private sector positions.

[6] The above includes public and private sector positions.

[7] The above includes only state agency positions.

EDUCATION

Nearly all of the colleges and universities in Idaho have or are planning to offer courses or programs with an environmental emphasis. Three of the state's colleges offer a Bachelor's degree in some aspect of environmental science.

The College of Idaho, located in Caldwell, Idaho, awards a Bachelor's degree in Human Ecology. Boise State University offers an undergraduate program in Environmental Health. While the program provides the student with an extensive technical background in general sciences, it also introduces the student to overall environmental health administrative and legislative techniques.

The third state college offering an environmental science emphasis is Lewis and Clark State College. A Bachelor of Science degree in Social Science with an option in Environmental Science is offered.

Other colleges offering individual courses are Idaho State University, College of Southern Idaho, North Idaho College, and Ricks College. While Idaho State University offers two environmental courses, Environmental Technology and Environmental Health, a degree program is also available in Conservation. The College of Southern Idaho offers the course, Man and Environment while Ricks College has a select course in both Ecology and Field Ecology. The North Idaho College has a program in Social Ecology Resource Conservation.

Two college programs are detailed in the State Report: Boise State University and College of Idaho.

LEGISLATION

The environmental/energy legislation for Idaho was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Protection and Health Act of 1972
Pesticide Use and Application Law
Pesticide Law
Local Planning Act of 1975
Solid Waste Law

National Environmental Energy Workforce Assessment

Phase I

ILLINOIS

State Summary

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I. AIR

Air pollution control and abatement activities in Illinois are the responsibility of the Air Pollution Control Division of the Illinois Environmental Protection Agency. The Agency's mandate covers stationary sources and vehicular emissions.

The current staffing level of the Division's two branches is 130. Engineers continue to dominate the employment profile, although their numbers have been reduced from 69 in 1974 to 55 in 1976. The loss in engineering positions has been offset by increases in the technician category. This trend is thought to have leveled off. Future increases are expected to be about equal (though small) for engineers, technicians, and meteorologists and scientists.

Division supervisiory personnel anticipate a staffing increase of approximately two percent per annum over the next five years. Budgetary constraints and the mature status of the air program combine to create a situation in which monies available will be channeled toward other programs with demonstrable need of expansion to achieve maturity. The effects of this situation are furthered by the assumption that no changes in or additions to legislation or regulations affecting the Division's activities will be made before 1982.

II. NOISE

The comprehensive stationary source noise pollution control program of Illinois is administered by the Illinois Environmental Protection Agency's Division of Noise Pollution Control. Regulations regarding vehicular noise are expected to be promulgated in 1977.

The Division is staffed by 18 persons: 11 engineers (nine are in field operations and two are in technical operations), five administrative personnel, and two attorneys. Most instances of potential violations of noise regulations are brought to the attention of IEPA personnel by private complainants. Monitoring activities in response to complaints have resulted in an extensive data file of stationary noise source information.

Although the vehicular noise regulations are expected to be promulgated in 1977 and additional regulations are being considered for blasting and drop forge operations, no increases in the Division staffing level are anticipated. Increased workload for the Division staff and the addition of noise control responsibilities to other state employees' duties (specifically state police) are planned.

Professional estimates place the number of persons in the private sector whose jobs include substantial noise control related activities at approximately 500. This workforce is expected to increase at a rate of three to five percent per year. Many positions will require considerable training in acoustics.

III. PESTICIDES

Responsibility for the control of pesticide use in Illinois is shared by the Illinois Department of Agriculture (IDA) and the Illinois Department of Public Health (IDPH), Pesticides Section. IDPH is charged with regulation of structural pest control; IDA is responsible for all other pest control categories and administration of the Federal Insecticide, Fungicide, and Rodenticide Act. The University of Illinois Cooperative Extension Service works closely with IDA in applicator training and certification.

The IDPH Pesticides Section consists of one entomologist and one biologist. They are supported by more than 100 field personnel of the Division of General Sanitation who are involved in pesticide use activities in the context of their regular duties. The IDA employs 20 persons, 14 of whom are part-time field men, in its pesticides program. The Cooperative Extension Service has 127 persons (including 98 county agents) involved in pesticides training activities and research. The IDA and Extension employees are trained as entomologists or agronomists.

No increases in public sector personnel are expected. More than 10,000 farmers have been certified in accordance with the conditions of FIFRA; the total is expected to reach 80,000 by March, 1978. Private sector certificate holders under FIFRA are expected to include 12,000 owners, operators, applicators and 625 tree experts.

IV. POTABLE WATER

Regulation and surveillance of potable water supplies is shared by the Illinois Environmental Protection Agency (IEPA) and the Illinois Department of Public Health (IDPH). Illinois has made no decision regarding primacy for the Federal Safe Drinking Water Act (SDWA). IEPA, which monitors the 1,700 minicipal water supply systems, has been designated the lead agency; but most of the estimated 11,000 sources defined as public water supplies under SDWA not now covered by Illinois law would come under the purview of IDPH.

IDPH field water supply activities are not broken out from other duties. Officials estimate eight to ten person-years are devoted to water supply. Laboratory personnel include 35 persons whose duties range from full-time to occasional water analysis work. IEPA, Division of Public Water Supplies, employs 42 persons. The Division of Laboratory Services has 24 involved in water analysis.

Projected public workforce needs are dependent upon assumption of SDWA primacy by the state. If this occurs, the workfoce may expand from the 1976 level of 96 to 155 in 1981. IDPH additions may include 20 engineers, 20 sanitarians, and 7 biologists. IEPA expects no increase.

Certified water treatment plant operators are expected to increase from the present 2,505 to 3,198 in 1981. Non-certified treatment plant personnel are expected to increase at a rate of less than five percent per year.

V. RADIATION

Two divisions of the Illinois Department of Public Health (IDPH) share monitoring and radiation source control responsibilities. The Division of Radiological Health is responsible for medical and other non-energy related uses of radiation. It monitors 7,400 medical facilities, 700 industrial facilities, and three major pharmaceutical firms. The Division of Nuclear Safety is responsible for health and safety related to nuclear energy and the uranium fuel cycle. Currently, there are seven nuclear power reactors operating at three sites, eight under construction, and two planned. There is a large uranium-hexafluoride conversion facility, a nuclear spent fuel storage facility, two nuclear related federal research installations, and a low-level nuclear solid waste disposal site.

The Division of Radiological Health consists of seven physicists and thirteen technicians (three additional positions are vacant). The Division of Nuclear Safety employs one physicist, one chemist, three engineers, and one technician. They are assisted by a chemist and a technician in laboratory services.

If Illinois does not become a Nuclear Regulatory Commission agreement state, the public sector workforce is expected to expand only slightly by 1982. One physicist, one chemist, and one engineer may be added; the three vacant technician positions are expected to be filled and one added. No projections are available which assume NRC agreement status.

VI. SOLID WASTE

The Division of Land Pollution Control of the Illinois Environmental Protection Agency (IEPA) is charged with solid waste pollution control in Illinois. There are 465 solid waste disposal sites; slightly more than one-half are defined as municipal or general; the remainder are demolition sites. The IEPA estimates that more than 60 percent of the solid waste in Illinois is generated in the six-county Chicago metropolitan area.

Resource recovery activities include the recently completed City of Chicago/Commonwealth Edison Refuse Derived Fuel (RDF) power generation plant, which operates on fuel consisting of 90 percent coal and ten percent solid waste. A similar but smaller plant is planned for Springfield.

The safe disposal of hazardous materials and liquid wastes is considered of primary concern to IEPA and the relatively few firms which handle them.

The IEPA Division of Land Pollution Control is staffed by seven engineers, four biologists, nine geologists, two sanitarians, two attorneys, seven technicians, and five clerical persons. The Division expects to add one engineer, a technician and three positions classified as "other" by 1982.

The private sector workforce is expected to increase from the present estimated 12,295 engaged in collection, disposal and resource recovery to 16,476 in 1981. Should resource recovery activities accelerate, the increase may be substantially greater.

VII. WASTEWATER

The wastewater program in Illinois is under the direction of the Division of Water Pollution Control, Illinois Environmental Protection Agency (IEPA). Illinois is not actively seeking National Pollution Discharge Elimination System (NPDES) authority.

The Division of Water Pollution Control is staffed by 196 persons. Seventy-six are engineers; 18 are classified as resource planners, with a minimum of a four-year degree in resource or urban planning; 27 are environmental protection specialists (degreed in the natural sciences or chemistry); nine are attorneys; 13 are environmental technicians, who have at least a high school education and extensive on-the-job training; six are aquatic biologists; the remainder are administrators, accountants, and clerical persons. Although Division personnel anticipate a need for additional positions to deal with future program development, no increase is expected through 1981.

Certified wastewater treatment plant operators now total 2,201 and are expected to total 3,385 in 1981. Certified personnel are estimated to comprise less than 25 percent of the total private sector workforce. This percentage is expected to increase as IEPA continues its efforts in training and certification of operators.

VIII. ENERGY

Responsibilities for energy related matters are scattered throughout the governmental structure of Illinois. Several plans for reorganization, with the emphasis upon consolidation of energy responsibilities, have been proposed. Acceptance of any of the proposals is unlikely at this time.

There are two entities whose primary responsibilities are energy related. The Division of Energy (DOE) is currently a unit of the Department of Business and Economic Development. DOE began as the Office of the Fuel and Energy Coordinator; its responsitilities were expanded by the governor when it was given divisional status. DOE activities are hampered because of a lack of any legislated mandate. Staffing is fluid. Currently, three persons are involved in fuel allocation, two in coal development, three in program development, and twelve (four of them contractual) in energy conservation and alternative energy sources.

The Illinois Energy Resources Commission (IERC) is a legislative commission comprised of eight legislative and ten public members. The permanent staff of three has been temporarily expanded to eleven. The temporary staff is involved in drafting energy legislation and developing government reorganization plans.

No estimates of the present private sector energy pollution control and abatement workforce or projections for the future are available for this nebulous area.

STATE OF ILLINOIS - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR[1]	130	132	136	139	142	144	2%
NOISE[2]	18	18	18	18	18	18	0%
PESTICIDES[3]	257	257	257	257	257	257	0%
POTABLE WATER[4]	96	96	124	155	155	155	N/A
RADIATION[5]	32	32	35	37	38	40	5%
SOLID WASTE[6]	36	37	38	39	40	41	3%
WASTEWATER[7]	196	196	196	196	196	196	0%
ENERGY[8]	--	--	--	--	--	--	N/A
TOTALS	729	786	804	841	846	851	3%

[1] The above represents only state program personnel.

[2] The above does not include private sector, for which no figures were available.

[3] The above does not include 750 state transportation and local personnel, 80,000 farmers, 12,000 private applicators, or 625 tree experts who will be certified.

[4] The above does not include the estimated 693 water treatment plant operators who will be certified over the next five years. SDWA primacy by the state is assumed.

[5] The above includes only state agency personnel.

[6] The above does not include the private sector personnel, estimated to increase by 4,181 over the next five years.

[7] The above does not include the estimated increase of 1,184 (9% per annum growth) for certified operators over the next five years.

[8] The energy workforce situation is too fluid for projections to be made.

EDUCATION

Illinois has an extensive array of environmental/energy programs at the post-secondary level. In 1974-75, the Illinois Institute for Environmental Quality and the Illinois Board of Higher Education pooled resources to develop a "Master Plan for Environmental/Energy Higher Education in Illinois". The U.S. Environmental Protection Agency joined in the effort and provided funds which enlarged the scope of the project. In May, 1975, the results of the project were published under the title, "A Work Force for Environment and Energy." The book includes the following types of information concerning environmental/energy post-secondary education in Illinois:

1) Detailed descriptions of ongoing environmental and energy programs at state universities in Illinois;
2) Descriptions of proposed environmental and energy programs at state universities in Illinois;
3) Recommendations for Illinois Board of Higher Education approval of proposed environmental and energy programs;
4) Brief descriptions of environmental and energy educational programs offered in private universities and colleges in Illinois;
5) Synopses of programs and course offerings at Illinois community colleges;
6) Recommendation for initiating and implementing environmental/energy operating plans for the campus of each public university and college in Illinois;
7) Recommendation for establishing Environmental Resource Centers at community colleges;
8) Suggested curricula for Illinois community college degree and certificate programs;
9) Manpower study of pollution control fields in Illinois;
10) A variety of recommendations and reference materials to enhance cooperation among institutions of higher education in Illinois in environmental and every related matters.

LEGISLATION

The environmental/energy legislation for Illinois was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Protection Act

Custom Application of Pesticides Law

Pesticide Use in Illinois

Water Supply Operator Certification Law

Radiation Installation Registration Law

Radiation Monitoring Act

Radiation Protection Act

Surface-Mined Land Conservation and Reclamation Act of 1971

National Environmental Energy Workforce Assessment

Phase I

INDIANA

State Summary

I. AIR

Indiana ranks among the nation's top ten manufacturing states. With the numerous benefits accrued through this industrialization, the state has experienced varied and significant air pollution problems. The state recognized the need for monitoring and control of the emerging air pollution problems as early as 1961. During 1961, the Indiana Air Pollution Control Law was adopted. In 1962, the Indiana Air Pollution Control Division, an office of the Indiana State Board of Health, was created and delegated the administrative responsibility for air pollution control activities.

The Air Pollution Control Division is currently staffed with 101 positions: 86 professionals and 15 clerical. The professional staff members represent a variety of disciplines including engineering, sciences, law, computer science, and electronics. The Division predicts an average annual growth rate of 8% through 1981. The greatest increase will be in the legal and engineering categories.

Some of the responsibility for air pollution control has been delegated to the ten local air pollution control agencies. The local agencies have a cumulative professional staff of 55 members. The professions represented include engineering, law, physical and research science, and technical trades. Minimal growth is estimated for the local agencies through 1981. A maximum growth of 4% per annum is projected. The most significant growth will occur in the legal and scientist categories.

II. NOISE

Industrial/Environmental noise control and abatement activities within Indiana are emerging. During 1976, there was a one hundred percent increase in the number of complaints filed concerning industrial noise. Noise control activities have been delegated to the Indiana State Board of Health.

The Board of Health currently employs two persons whose responsibilities include follow-up on community/environmental noise complaints. These two persons have a background in industrial hygiene and have been providing technical assistance to municipalities in the development of noise ordinances. It is estimated that less than one-half person-year is devoted to community and environmental noise activities. The Board anticipates an expanded interest in noise control during the next five years. In response to this demand, the Board is requesting two additional positions for the coming year (1977). It is hoped that these two positions will be filled by engineers with some experience in noise and acoustics. Addditional positions may be required to meet the expanding need for noise control; however, additional projections are not currently available.

Municipalities and private industries within Indiana have relatively underdeveloped noise control programs. Six cities currently have operational noise programs. These programs are frequently operated through the police department. Generally, one police officer has been delegated responsibility for the program.

III. PESTICIDES

The Indiana Office of the State Chemist and Seed Commissioner is the principal pesticide regulation and control unit within the state. Until recently, the Office has been primarily concerned with product registration and product quality; however, late in 1975, the Office became the lead agency for the coordination of pesticide applicator certification.

The Office of the State Chemist is currently staffed by 15 professionals: 13 chemists and 2 entomologists. Four of the 15 staff members are directly involved with the applicator certification program. Five additional positions are planned for the certification program. These positions are likely to be filled by persons with experience in chemistry, entomology, or a related science. Staffing levels for the pesticide program are estimated to remain stable through 1982; however, more accurate projections of staffing requirements will be available after the program has been in operation for a full year.

Information of pesticide-related occupations within the private sector is limited. It is estimated that there are 35,000 to 105,000 farmers within the state who will seek certification as private pesticide applicator. There are an additional 7,000 to 8,000 licensed operators, licensed applicators, licensed public applicators and other certified commercial applicators who will require commercial certification. No projections can be made on growth or decline within the private sector.

IV. POTABLE WATER

The Public Water Supply Section of the Division of Sanitary Engineering is the principal potable water classification and surveillance section within the Indiana State Board of Health. The primary goal of the Section is to ensure that all public water supplies are continuously operated and maintained.

The Public Water Supply Section employs 11 professionals and 3 clerical persons. The professionals include nine engineers and two water works supervisors. The Section expects to grow by about 200% over the next five years. The greatest growth will be in the engineer and sanitarian categories. This growth is related to enforcement activities under the Safe Drinking Water Act.

The Water and Sewage Laboratory of the State Board of Health provides laboratory support to the Section. Approximately 8.5 person years of support is provided annually. The staffing requirements for the Laboratory are expected to increase by 10% annually over the next five years. The growth will occur in both the chemist and microbiologist category.

Experts within the state indicated that there may be in excess of 2,500 persons actively employed in public water supply systems in Indiana. During the next five years there will be some growth in the number of persons employed in the municipal water supply systems. It is estimated that there will be an average annual increase of 50 new employees requiring certification annually: 35 of the 50 will be operators. Growth will occur due to expansion and upgrading of existing facilities.

V. RADIATION

Within the State of Indiana, the environmental radiation and radiological health programs are administered by the Radiological Health Section of the Division of Industrial Hygiene and Radiological Health. The primary goal of the Section has been to improve the control of harmful radiation effects to the citizens of Indiana.

The Radiological Health Section is currently staffed with six professionals and one and one-fourth clerical positions. The professional positions include two health physicists, three sanitarians, and one part-time administrator. During the past two years, the Section has experienced a sudden growth. This increase has been brought about by the state seeking NRC "agreement state" status. Optimistic estimates indicate that the state will achieve this status within three years. The Section has requested an additional eight staff positions, all radiation health physicists, for the next fiscal year (1977); however, the Section estimates that four of the positions will be funded. If activities in the department continue to expand, additional staff members may be required.

Workforce statistics for the "radiation control" occupations within the private sector are nebulous. Professional estimates indicated that universities, hospitals, and physicians/dentists account for a major segment of the private sector radiation programs. Increases within the private sector are expected to be minimal during the next five years.

VI. SOLID WASTE

The Solid Waste Management Section of the Indiana State Board of Health has the overall administrative responsibility for the state's solid waste program. The primary role of the program is to provide technical assistance, planning assistance, surveillance/ enforcement activities, and operator training.

The Solid Waste Management Section is currently staffed by twelve professionals: 3 engineers, 8 sanitarians, and 1 research scientist. The Section will experience a steady growth over the next five years. The Section predicts a 35% per annum growth, with the greatest demand occuring in the engineer and sanitarian categories. The subsection experiencing the greatest growth rate will be the Hazardous Waste Program.

There are currently 126 sanitary landfills in the state. There are approximately 100 landfill supervisors and an estimated 400-450 landfill operators. In addition, it is estimated that there are 114 gate attendants, 71 mechanics, and 16 weighmasters employed at the sites. A recent survey conducted by the Board of Health revealed that there are approximately 736 employees in collection systems in the state. Hazardous wastes are currently accommodated within sanitary landfills, and there are no existing resource recovery programs. The sanitary landfill workforce is expected to increase a minimum of 5% annually over the next five years. The collection system workforce is also expected to experience a slight increase averaging 5% per annum. A resource recovery program staffed with 15 professionals is planned for the next two years.

VII. WASTE WATER

The Water Pollution Control Division of the Indiana State Board of Health administers the Municipal Construction Grant Program, NPDES Permit Program, the Oil and Hazardous Materials Spill Response Program, and the Area-Wide Section 208 Planning Program. The Water and Sewage Laboratory provide supportive services to the Division in the analysis of waste water samples.

The Water Pollution Control Division has 122 full-time authorized positions; however, only 112 of those professional positions are currently filled. The professional positions include engineers, sanitarians, attorneys, planners, administrators, biologists, and sewage works supervisors. Over the next five years the Division will experience substantial growth, with an average annual rate of 13%. Implementation of PL 92-500 will have the greatest single impact upon the staffing of the Division.

There are 110 Class I, 120 Class II, 54 Class III, and 28 Class IV waste water treatment facilities in the state. These facilities are currently staffed with 1,751 full-time and 430 part-time employees. These figures include operators, maintenance personnel, laboratory personnel, laborers, supervisory and other. The Water Pollution Control Division anticipates up to a 300% increase in the number of employees in the waste water treatment facilities during the next five years.

VIII. ENERGY

Indiana, as one of the top ten industrial states, has a major interest in energy production. While the state has a designated energy office, the Indiana State Energy Office, the Office has had limited responsibilities. The primary emphasis of the Office has been public relations and administering the federal mandatory petroleum allocation program.

The State Energy Office is currently staffed with five professional and two clerical positions. Two of the professionals are basic administrative positions, a third position is responsible for the Governor's Pride Program, a fourth has delegated responsiblity for solar energy, and the fifth professional is administering the mandatory petroleum program.

During the past year, two positions were eliminated from the staff due to budget reduction. However, with the immediate need to resolve many of the energy related problems facing the state, the Office is expected to grow slowly during the next five years. The Office predicts that three positions will be added to the Office during the coming five years: a librarian, an engineer, and a computer scientist.

Limited information is available on private sector workforce projections; however, the construction of two nuclear power plants in the state will have a measurable impact upon private sector energy related occupations.

STATE OF INDIANA - SUMMARY

National Environmental/Energy Workforce Assessment
Pollution Control & Abatement Personnel
Projected Workforce Requirements (1976-1981)

Environmental Area	1976	1977	1978	1979	1980	1981	%/annum growth (average)
AIR	1,468	1,594	1,685	1,760	1,868	1,989	6%
NOISE[1]	1	2	2	2	2	2	n/a
PESTICIDES[2]	15	19	19	19	19	19	n/a
POTABLE WATER[3]	30	43	53	69	71	75	n/a
RADIATION[4]	6	10	10	12	14	14	n/a
SOLID WASTE[5]	1,449	1,529	1,650	1,735	1,827	1,922	6%
WASTEWATER[6]	2,293	3,173	4,068	4,934	5,824	6,701	24%
ENERGY[7]	7	7	7	9	10	10	n/a
TOTALS	5,269	6,377	7,494	8,540	9,635	10,732	15%

[1] The above does not include the estimated 800 safety officers with some noise-related responsibility.

[2] This figure includes only state staff; it does not include the 105,000 farmers, 7,000 to 8,000 licensed operators, licensed applicators, licensed public applicators, and other certified commercial applicators, or the 800 to 1,000 pesticide dealers. No information was available on the growth in these categories.

[3] The above does not include the more than 2,500 persons employed in public water systems.

[4] These figures do not include information on the private sector.

[5] These figures do not include any statistics on the resource recovery field.

[6] Each of the above estimates includes 19% part-time employees.

[7] The above figures do not include information on the private sector.

EDUCATION

The educational institutions in Indiana offer a wide variety of environmental education programs. While many of the colleges and universities in the state offer environmentally related programs, there are several notable programs. Ball State University, located in Muncie,offers programs on both the undergraduate and graduate level. Ball State also has an operable Institute for Environmental Studies.

Graduate degrees in environmental studies are also available through the School of Public and Environmental Affairs. The School is a multi-campus programs. The program is currently available through the Indiana University campuses located in Bloomington, Indianapolis, Northwestern, Fort Wayne, and South Bend. Degrees available through the School include A.S., B.S., M.S., M.P.A., and Ph.D.

The University of Evansville, the University of Notre Dame, and Purdue University also have well developed environmental programs on the Bachelor of Science level.

Indiana Vocational Technical Schools, the Indiana Community College System, offers a number of certificate, A.S. degree, and community education programs. The Pollution Treatment Technology Program, an Associate in Science program available through the Gary Campus,is particularly outstanding. A comprehensive community education environmental technology program is being coordinated through the Gary Campus.

LEGISLATION

The environmental/energy legislation for Indiana was obtained by request from various agency personnel and through various library references. Summaries of the legislation deemed most relevant to the eight subject areas of the workforce assessment were prepared, and are included in the respective state reports. The following list of laws represents virtually all environmental legislation for the state. Only certain of the following laws were summarized; the list is presented to show, by title, the kinds of laws which have been enacted.

Environmental Management Act

Environmental Law

Air Pollution Control Law

Pesticide Use and Application Law

Pesticides Law

Certification of Water and Waste Water Treatment Plant Operators Law

Radiation Control Act of Indiana

Refuse Disposal Act

Litter Control Law

Abandoned Vehicle Act

Highway Junkyard Control Act

Confined Feeding Control Law

Phosphate Detergent Law

Indiana Stream Pollution Control Law